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TRANSACTIONS

OF THE

WOOLHOPE

NATURALISTS' FIELD CLUB.

[ESTABLISHED 1851.]

1852 TO 1865.

COLLATED AND COMPILED BY

H. CECIL MOORE, HONORARY SECRETARY.

"HOPE ON."

"HOPE EVER."

HEREFORD:

PRINTED BY JAKEMAN AND CARVER, 4 & 5, HIGH TOWN.

ISSUED DECEMBER, 1907.

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TRANSACTIONS

OF THE

Woolhope Naturalists' Field Club.

1852—1865.

INTRODUCTION.

The Woolhope Naturalists' Field Club, according to the Title-page of its earliest publications, was established in 1851, and, as we gather from subsequent issues, during the winter period of the end of that year. The earliest minutes, however, which we possess are dated Tuesday, April 13th, 1852, when Mr. R. M. Lingwood was in the chair. The twelve Rules of the Club are entered upon the minutes. Rule 2 regulates "That the Club consists of 40 Members, with such Honorary Members as may be admitted from time to time. . ." That the formation of the Club had received mature consideration preliminary to this first record of its proceedings, may be assumed from the fact that, at this its first recorded meeting, 30 Members were elected upon its foundation. Seven of the most distinguished authorities in our Kingdom on Geology and Botany were at this same meeting elected honorary members. Mr. R. M. Lingwood was elected President. The thanks of the meeting were voted to Mr. M. J. Scobie for his exertions in establishing the Club, and he was elected Honorary Secretary.

The first bound volume of the Transactions of the Club contains the proceedings of the year 1866. The proceedings of the Club during the fourteen years, 1852 to 1865, were generally summarised or epitomised in the annual address of the President for each respective year. Only six printed publications were issued during those fourteen years; these were in pamphlet form with paper covers. Possibly not more than one or two complete sets of the six parts are in any one's possession. These six parts are incorporated in their proper sequence in this volume.

Fortunately there was amongst the earliest members of the Club a chiel taking notes, who published them in one of our local newspapers, the *Hereford Times*. This was Mr. Flavell

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Edmunds, a good botanist, and a scholar of various scientific attainments. To the *Hereford Times*, of which paper he was the Editor, we owe our records of many very valuable articles.

In the compilation of this volume I have, in addition to consulting the volumes of the *Hereford Times* in our Reference Library, availed myself of the Minute Book of the Club, and of the Proceedings of contiguous kindred Clubs. My best thanks are due to Mr. Walter Pilley for the loan of his collections, which have supplied many references.

Rule 1 of the Club determines its object:—"For the practical study, in all its branches, of the Natural History of Herefordshire and the districts immediately adjacent." This is very comprehensive.

From its origin the Club has been in a state of "evolution"; and its fields of investigation and research considerably widened. In the Rules published for 1903 the subject of Archæology was added to Rule 1. Our Members are not limited. At the end of 1907 our Club embraces about 260 ordinary Members. Including our Honorary Members and Officials of Corresponding Societies with whom our *Transactions* are exchanged, we forward more than 300 of our publications when issued.

We now possess eighteen bound volumes treating principally of our beautiful county. Our nineteenth volume, now in the press, will bring the Geology, Botany, and Mycology of the county up to date. There is much more work to be done, especially in details of Geology, examination of Drifts, exposition of the general configuration and formation of the scenery of the county, and the causes to which it is due.

On the completion of my task, however imperfectly performed, I am sensible that our Members will highly appreciate the ground work established by previous labourers. My desire is that the study thereof will stimulate each individual to contribute to the stores of our knowledge, thus ensuring the continued progress of the Club and the maintenance of its reputation.

H. CECIL MOORE.

14th November, 1907.

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The following original Rules are copied from the Minute Book of the Club, dated April 13th, 1852.

RULES

OF THE

Woolhope Naturalists' Field Club.

I.—That a Society be formed under the name of "THE WOOLHOPE NATURALISTS' FIELD CLUB" for the practical study, in all its branches, of the Natural History of Herefordshire and the districts immediately adjacent.

II.—That the Club consist of Forty Members, with such Honorary Members as may be admitted from time to time; from which number a President and Honorary Secretary be appointed at the Annual Meeting, to be held at Hereford on the Fourth Monday of January in each year.

III.—That the Members of the Club shall hold three Field Meetings during the year in the most interesting localities for investigation of the Natural History of the district. That the days and places of meeting be selected at the Annual Meeting, and that timely notices of each be communicated to the Members by a circular card from the Secretary.

IV.—That those Members to whom it may be convenient shall breakfast together at the nearest country Inn at 9 o'clock, after which the researches of the day shall commence.

V.—That 4 be the hour appointed for Dinner, after which any papers shall be read by the respective authors. Each Member may introduce a friend on such occasions who must pay his own expenses.

VI.—That the Annual Subscription be Ten Shillings, to be laid out in defraying the cost of printing such papers as may be selected for that purpose by a Committee of Five Members selected at the Annual Meeting from the general body, and to meet any expenses

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which may be incurred for stationery, postage, &c. That the cost of any lithographic or other illustrations be defrayed by the author of the paper for which they may be required.

VII.—That the papers of the Club be printed in a cheap octavo form.

VIII.—That at the Annual Meeting the President be requested to favour the Club with an address containing a written summary of its proceedings at the several Field Meetings during the previous year, together with such observations from himself as he may deem conducive to the welfare of the Club, and the promotion of its objects.

IX.—That all Candidates for Membership shall be proposed and seconded by existing Members, either verbally or in writing, at any Meeting of the Club, and shall be eligible to be balloted for at the next Meeting, provided there be FIVE Members present; one black ball in three to exclude.

X.—That Members finding rare or interesting specimens, or observing any remarkable phenomenon relating to any branch of Natural History, shall immediately forward a statement thereof to the Honorary Secretary.

XI.—That the Woolhope Naturalists' Field Club undertake the formation of and publication of correct lists of the various Natural productions of the County of Hereford, with such observations as their respective authors may deem necessary.

XII.—That these Rules be printed and a copy sent to each Member.

April 13th, 1852.

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Woolhope Naturalists' Field Club.

OFFICERS FOR THE YEAR 1852.

President:

R. M. LINGWOOD, ESQ., Lyston, Herefordshire.

Honorary Secretary:

M. J. SCOBIE, ESQ., Hereford.

Honorary Members:

SIR ROD. I. MURCHISON, G.O.St.S., F.R.S., F.G.S., &c., London.
PROFESSOR JOHN PHILLIPS, F.R.S., F.G.S., &c., London.
PROFESSOR JOHN LINDLEY, Ph.D., F.R.S., London.
HUGH E. STRICKLAND, ESQ., M.A., F.G.S., Lecturer on Geology to the University of Oxford.
ROBERT E. GRANT, M.D., F.R.S., &c., London and Edinburgh.
REV. P. B. BRODIE, M.A., F.G.S., Foleshill, Warwickshire.
GEORGE BENTHAM, ESQ., Pontrilas, Herefordshire.

Members:

REV. J. H. BARKER, Hereford.
A. C. DE BOINVILLE, ESQ., Hereford.
H. G. BULL, M.D., Hereford.
THOS. CAM, F.R.C.S., Hereford.
REV. J. COMMELINE, Rector of Redmarley, Worcestershire.
REV. J. F. CROUCH, Pembridge Rectory, Herefordshire.
A. W. DAVIS, M.D., Tenbury.
J. E. DAVIS, F.G.S., Tenbury.
REV. W. C. FOWLE, Ewias Harold, Herefordshire.
R. W. FRYER, Hereford.
REV. R. LANE FREER, F.S.A., Bishopstone, Herefordshire.
W. L. GILLILAND, M.D., Hereford.
W. C. HENRY, M.D., Haffield, Ledbury.
REV. REGINALD HILL, Cradley, Worcestershire.
REV. R. HOLMES, Eldersfield Vicarage, Worcestershire.
RICHARD JOHNSON, Hereford.
R. M. LINGWOOD, Lyston, Herefordshire.
THOS. H. LEE WARNER, Tibberton Court, Herefordshire.
REV. T. T. LEWIS, Aymestrey, Herefordshire.
EDMUND LECHMERE, The Rhydd, Worcestershire.
CHAS. LINGEN, M.D., F.R.C.S., Hereford.
W. H. PURCHAS, Ross.
W. S. ROOTES, M.D., Ross.
ANDREW ROWAN, M.D., Hereford.
REV. WM. S. SYMONDS, Pendock Rectory, near Tewkesbury.
M. J. SCOBIE, F.G.S., Hereford.
J. A. F. SUTER, Abergavenny.
HENRY STONE, Chambers Court, Worcestershire.
A. THOMPSON, Hereford.
REV. H. J. TAYLOR, Rector of Upton-on-Severn.

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Woolhope Naturalists' Field Club.

Presidents

FROM ITS ESTABLISHENT IN 1851.

1851 Club formed in the winter months.

1852 Lingwood, Mr. R. M.

1853 Lewis, Rev. T. T.

1854 Symonds, Rev. Wm. S., F.G.S.

1855 Crouch, Rev. J. F., B.D.

1856 Wheatley, Mr. Hewett.

1857 Lingen, Charles, M.D., F.R.C.S.

1858 Bevan, G. P., M.D.

1859 Bevan, G. P., M.D.

1860 Banks, Mr. R. W.

1861 Lightbody, Mr. Robert.

1862 Hoskyns, Mr. Chandos Wren.

1863 Hoskyns, Mr. Chandos Wren.

1864 Crouch, Rev. J. F., B.D.

1865 Steele, M. Elmes Y.

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1865.

Woolhope Naturalists' Field Club.

LIST OF HONORARY MEMBERS.

Sir W. Jardine, Bart., Jardine Hall, Dumfriesshire.

Sir Charles Lyell, Bart., M.A., F.R.S., London.

Sir Roderick I. Murchison, Bart., F.R.S., F.G.S., F.R.G.S., London.

George Bentham, Esq., President of the Linnæan Society.

Rev. P. B. Brodie, M.A., F.G.S., Vicarage, Rowington, Warwick.

J. E. Davis, Esq., F.G.S., London.

W. Henry Fitton, Esq., M.D., F.R.S., F.G.S.

Dr. H. B. Geinitz, Professor of Geology & Mineralogy in the University, Dresden.

Professor John Lindley, Ph. D., F.R.S.

Professor W. Melville, Queen's College, Galway, Ireland.

Professor John Phillips, F.R.S., F.G.S., St. Mary's Lodge, York.

Rev. W. H. Purchas, Highfield Cottage, Lydney.

J. W. Salter, Esq., F.G.S., &c., London.

Rev. Professor A. Sedgwick, B.D., F.R.S. F.G.S., University, Cambridge.

Worcestershire Natural History Society.

Sir Charles Hastings, M.D., Worcester, President.

The Cotteswold Naturalists' Field Club.

Major Sir W. V. Guise, Bart., F.L.S., F.G.S., Elmore Court, Gloucester, President.

W. H. Paine, Esq., Stroud, Honorary Secretary.

The Malvern Naturalists' Field Club.

Rev. W. S. Symonds, F.G.S., Pendock Rectory, Tewkesbury, President.

Edwin Lees, Esq., F.L.S., F.G.S., Greenhill Summit, Worcester, Vice-President.

Rev. R. P. Hill, Bromesberrow Rectory, Ledbury, Hon. Secretary.

The President of the Warwickshire Naturalists' Field Club.

The President, Vice-President, and Hon. Secretary of Worcestershire Naturalists' Club.

The President, Vice-President, and Hon. Secretary of the Oswestry and Welshpool Naturalists' Field Club.

The President, Vice-President, Curator, and Hon Secretary of the Dudley and Midland Geological and Scientific Society and Field Club.

The President, Vice-Presidents, and Hon. Secretary of the Severn Valley Field Club.

The President, three Vice-Presidents, and Hon. Secretary of the Caradock Field Club, Shropshire.

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1865.

LIST OF MEMBERS.

Adams, W., Esq.
Armitage, Arthur, Esq.
Banks, R. W., Esq.
Baylis, Philip, Esq.
Bevan, G. P., Esq.
Blashill, Thomas, Esq.
Bright, H., Esq.
Bull, H. G., Esq., M.D.
Cam, Thomas, Esq.
Candy, Rev. T. H.
Capel, Rev. Bury.
Clive, G., Esq., M.P.
Cocking, George, Esq.
Colvin, Colonel.
Cornewall, Rev. G. H.
Crouch, Rev. J. F.
Curley, Timothy, Esq.
Davies, Isaac, Esq., C.E.
Dixon, Rev. R.
Du Buisson, Rev. E.
Eld, Rev. F. J.
Fielden, Lieutenant-Colonel
Garrold, T. W., Esq.
Gray, Rev. Arthur.
Greenhow, R.. Esq.
Hanbury, Rev. J. Capel
Hereford, Richard, Esq.
Hereford, Rev. R.
Hill, Rev. H. T.
Hoskyns, Chandos Wren, Esq.
Jenkins, Henry, Esq,
Johnson, R., Esq.
Jones Thomas, Rev. W.
Jukes, Rev. J. H.
Key, Rev. H. C.
King, Rev. T.
Lee, John Edward, Esq.
Lightbody, R., Esq.
Lingwood, R. M., Esq.
Martin, C. J., Esq.
McCullough, D. M., Esq., M.D.
Merewether, Rev. F.
Mildmay, Humphrey, Esq.
Morris, J. G., Esq.
Newton, Marcellus, Esq.
Nicholls, W. H., Esq.
Phillips, William, Esq.
Phillott, Rev. H. W.
Poole, Rev. William.
Power, Captain.
Purchas, Alfred, Esq.
Salwey, Humphrey, Esq.
Scudamore, Colonel.
Smith, Rev. Charles.
Smith, J. E., Esq.
Stanhope, Rev. B. L. S.
Steele, Elmes Y., Esq.
Thompson, Arthur, Esq.
Weare, Rev. T. W.
West, Rev. T.
Woodhouse, Rev. T.

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1852.

Woolhope Naturalists' Field Club.

FROM THE "HEREFORD TIMES," 22ND MAY, 1852.

It has long been a subject of regret to the lovers of natural history and its kindred science of geology, that Herefordshire, although so situated as to promise a rich field of investigation, has been left almost unexplored, save by isolated observers, unaware of each other's labours, and therefore unable to prosecute the investigation comprehensively. The delightfnl "Natural History of Selborne," a book which has perhaps done more to spread a taste for natural history than any other ever written, is at once an instance how much matter of general interest can be collected within the compass of a single parish, and a guide to the mode in which the investigation of nature may be conducted. Its publication has been the means, doubtless, of enabling many other persons to commence the observation of nature under more advantageous circumstances, because it gives them facts to start from; and thus puts them in possession of the results of the Author's labour. For want of some such knowledge of each other's progress, visitors to the County—although men of immense general knowledge and habits of observation—have been left in ignorance of local circumstances which might have proved to be of immense value in the education of principles; while the County itself, although possessing in almost every parish a scene of far greater natural beauty than Selborne, and probably greater wealth in a botanical, a geological, a conchological, or a naturalistic view, can scarcely be said to be known at all, even to its inhabitants. By way of indicating the extent of the field of observation, in one department alone—botany—we may point to the subject of the prizes for wild flowers offered in connection with the Hereford Horticultural Society. It will be seen that a mere list of the common plants of this County, which are in flower at the present time, number 130 species. A vigorous attempt is now being made to extend the knowledge of Herefordshire among its inhabitants; and if it only meet with the support and co-operation which it deserves, great advantage will be conferred, not only upon the County itself, by opening up to its inhabitants wide and ever fresh sources of instructive amusement, but also upon the state of the naturalistic sciences generally, in the accumulation of new facts, or the confirmation or rejection of existing hypotheses.

The impetus to this very gratifying movement was given by a conversation which arose on the occasion of a recent visit and lecture of the Rev. W. S. Symonds, Rector of Pendock, Worcestershire, to the Literary, Philosophical, and Natural History Institution of this, his native City, in speaking of the eminent success of the Cotteswold, Tyne-side, and Berwick Field Clubs, in developing the fauna and flora of their districts. The hint to "do likewise"

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was not lost. An admirable instance of the manner in which the desired work might be accomplished was shortly afterwards given by the instructive lecture "On the Ferns of Herefordshire," by Mr. W. H. Purchas, of Ross; who added the expression of his earnest wish that the progress of natural science might be aided by the labours of local observers. The opportunity for putting into practice the hints of these two gentlemen was seized; and great credit is due to Mr. M. J. Scobie for the earnest and intelligent manner in which he at once set to work to organise the first Naturalists' Field Club for Herefordshire. In the work for which he was so well suited, Mr. Scobie was effectively aided by Mr. R. M. Lingwood, F.L.S., Mr. T. H. Lee Warner, Dr. Bull, Mr. Purchas, and other gentlemen. Nor was the countenance and aid of men of world-wide eminence in science wanting: Sir Roderick Murchison, whose researches in Herefordshire were the cause of his giving to the world his splendid work on the Silurian System, and Mr. H. E. Strickland, F.G.S., of Oxford, have both kindly interested themselves in the new Club, and both have expressed an intention of visiting its meetings as soon as practicable. With such powerful encouragement, and with the ready concurrence of the lovers of natural history and geology in the district, Mr. Scobie, the Hon. Secretary, has been enabled to mature his plan. We need not add our hearty wish for, as well as our confident belief in, the success of this movement for the extension of scientific knowledge. The Club has been styled The Woolhope Naturalists' Field Club, its first object being the investigation of the locality which is geologically known as "The Woolhope Valley of Elevation," a district which represents, as it were, an epitome of the history of immense tracts of the earth's surface. To the Geologist, its having been the birthplace, so to speak, of the Silurian System of Murchison, must make it ever classic ground. The operations of the Club, however, will not be confined to the Woolhope District; the vicinity of Whitchurch, and the limestone beds of Aymestry, have been selected for future excursions.

Our object in thus calling attention to the formation of this scientific Club is to point out a mode in which the intelligent everywhere throughout the County may aid its operations. The number of Members will necessarily be limited, but the effectiveness of the Club may be increased greatly by the neighbours of each Member making known to him any circumstance bearing upon natural history which they may consider interesting. The members themselves will of course cultivate habits of observation individually, so that each may be prepared to add to the common stock of information, at each successive meeting; but they will be all the better able to fulfil this duty, if each become a centre of those non-members who cultivate like pursuits. By and bye we hope to see other Clubs formed in different parts of the District; but the first object must obviously be to make the existing Club as efficient and useful as possible.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, TUESDAY, MAY 18TH, 1852.

HEREFORDSHIRE WILD FLOWERS.

We are requested to draw particular attention to the prizes offered for Wild Flowers at each of the forthcoming exhibitions of the Horticultural Society. At each show there will be prizes for "the best bouquet or device of wild flowers," and also for "the largest collection of different kinds;" and all are to have a paper attached to them to state in what wood, field, or parish they were gathered. It will be evident from these conditions that the Committee of the Society are not only desirous of having them at the Show, but also of ascertaining what wild flowers grow here, and where they grow, with a view to advancing the knowledge of the natural productions of the county. This is a step in the right direction, and we have much pleasure in calling attention to it. Let every parish send its collections, and the school children will like nothing better than gathering them, if the clergyman or schoolmaster would kindly allow them a half-holiday the day before, to do so. In this way much useful information will be procured, in a pleasing way, for an accurate list will be taken of all that are brought, and doubtless, moreover, should they be very numerous, extra prizes will be given to such as deserve them.

With a view of directing still closer attention to them, two special prizes have been offered, open to everyone, "for the best Herbarium of Herefordshire wild flowers, collected and dried by the exhibitor during the present year, the first prize consisting of a gold pencil case, the second prize of a silver pencil case. The plants are to be fastened on paper, with the Latin and English names, the date and locality where gathered, written on it. The collections are to be sent to the Honorary Secretary, Mr. Phillips, High Town, on or before Monday, September 6th, with a motto attached and a sealed envelope containing the name of the competitor. The plants will be restored to their owners." We trust these prizes will be well competed for, and again we call upon all lovers of our wild flowers, and all zealous for the scientific honour of our county, to bestir themselves, that the fields and woods, and hedgerows of our villages may be fairly represented at our Horticultural fêtes.

At the fourth soiree of the Hereford Literary and Philosophical Society on Friday, April 2nd, Mr. W. H. Purchas, of Ross, read an interesting paper on the Ferns of Herefordshire, illustrated by specimens and diagrams. Thanks were voted to Mr. Purchas, and Dr. Bull expressed a hope that the address would be followed up by a closer study of the Wild Flowers of Herefordshire generally, with a view to which he suggested that a few of the summer excursions of the

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Institution should be devoted to botanical research. If this Society, he said, could be the means of ascertaining the various species and localities of different plants in the County, an exceedingly interesting work might be published, which would tell the people in ages to come that it had existed usefully. Dr. Bull expressed a hope that Mr. Purchas would be induced to accompany the members in their excursions, and give them the benefit of the valuable knowledge he had already acquired as a botanist.

The first excursion of the members of the newly-formed association for the examination of the natural productions and phenomena of this County, took place on Tuesday, May 18th. The day was unfortunately most unfavourable, being the first thoroughly wet day for weeks past, to which circumstance was due the absence of many of the members. There was, however, a goodly attendance. The Members partook of an excellent breakfast together at Tarrington, at 9 a.m. After breakfast, the Rev. W. S. Symonds, rector of Pendock, Worcestershire, was voted into the chair, the president, Mr. R. M. Lingwood, being absent from illness. The Hon. Secretary, Mr. M. J. Scobie, of Hereford, read several letters from members who were unable, from various causes, to attend. He also read a note from Lady Emily Foley, who, upon being informed of the wish of the members to commence their investigations upon her grounds, with her characteristic kindness, at once acceded to the request, and gave every facility. Mr. Robertson, her ladyship's horticulturist, accordingly met the Members, and acted as their guide through the highly interesting gardens and conservatories. The continued heavy rain, however, prevented the members from starting upon their investigations until about noon. Meanwhile, some time was very profitably spent in examining a very interesting collection of mammalian remains, discovered during the formation of the Hereford and Gloucester Canal, in gravel beds of various ages. They belonged chiefly to extinct species of the elephant, the elk, and the deer; but there were also bones which may probably be referred to the hippopotamus. The Chairman remarked that their discovery was a most interesting fact in the geology of the County, in which so few instances of drift occur, and the gravels in which had been described as so poor in remains of that kind. In the conversation which ensued, the Reverend Reginald Hill, of Cradley, kindly undertook to examine the localities in which the bones had been found, which are situated mostly in the parish of Bosbury, and to communicate the results of his investigations on a future occasion. The unanimous thanks of the Meeting were voted to Mr. Ballard, of Hereford, to whom the remains belong, for his kindness in lending them on that occasion.

The Rev. R. Hill produced an interesting specimen of Caradoc Sandstone from the Malvern range, containing the characteristic fossils of the formation curiously altered by the action of heat. He had found it associated with trap which was doubtless coeval with the elevation of the Malvern syenitic ridge.

The Hon. Secretary then gratified the Meeting with the instructive paper which (at the request of the Rev. Chairman) we subjoin:—

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When, some years ago, I first turned my attention to the study of Geology, I viewed, with no small regret, my location upon the Old Red Sandstone of Herefordshire; for although by the laborious researches of eminent geologists in the same system in Scotland and elsewhere, the strata had yielded objects of the greatest palæontological interest, still that of Herefordshire enjoyed the reputation of being peculiarly destitute of organic remains.

The Silurian rocks, however, teeming as they do with the relics of the inhabitants of the early seas, seemed to offer a rich field for exploration, and I accordingly directed my attention to those formations as exhibited in the very attractive spot from which our Club derives its name, and which has to-day witnessed the practical commencement of its labours—I mean the Woolhope valley of elevation. But, finding the distance from Hereford too great for an ordinary walk, which only my leisure could afford me, I determined, notwithstanding their doubtful character, to form an acquaintance with the rocks in my more immediate neighbourhood. Acting upon this determination, I lost no opportunity of making my observations, and it was with no small satisfaction I at length discovered a remarkable protrusion of Downton Sandstones and Upper Ludlow Shale, at a spot where I little expected to meet with any member of the Silurian system. I allude to the elevated dome of Hagley Park, with its carbonaceous strata and fish bed, lately visited by Mr. H. E. Strickland, F.G.S., whose description of it will shortly appear in the Journal of the Geological Society of London. Continuing my investigations, other objects of local interest constantly forced themselves upon my attention; which, however, it is not my intention to particularize on the present occasion. The object I have in view on this, the first field meeting of the "Woolhope Club," is merely to give a short and general sketch of the phenomena around us, and to point out a few of the more striking objects within the range of our geological enquries. When Sir Roderick Murchison commenced his explorations of this region about 21 years ago, great obscurity rested upon the ancient rocks previously termed "Grauwacke." The importance of fossils as a key to the identification of strata—however different in lithic structure—had for some time previously been fully recognized by geologists in every part of the world; and great progress had consequently been made in the chronological classification of the various formations, from the Tertiary down to the Old Red Sandstone epoch. In order to take a comprehensive view of the subject, it will be necessary to direct attention to portions of the adjacent counties. Sir Roderick Murchison's eminent researches in "Siluria," and those of Professor Sedgwick in North Wales, were the means of connecting by a series of links, so to speak, the oldest sedimentary rocks—or the "transition" of Werner—with the newer, and already ascertained deposits. The terms "Transition" and "Grauwacke," I should observe, have by universal consent, fallen into disusage, and geologists now recognise them as forming one great system to which the term Silurian has been applied.

In no part of Great Britian is the geological sequence of the ancient fossiliferous rocks interpolating between the Old Red Sandstone and the Cambrian schists so complete as in the district now under review. They constitute the

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Silurian basin in which the Old Red or Devonian strata repose. and may be seen cropping out from beneath the Old Red at the margin of the basin at various points, at both the eastern and western limits of the county. We also become acquainted with them in the district of Woolhope, at Hagley Park, Shucknall Hill, and other places where it is to be remarked they are thrust through the superincumbent Old Red Sandstone by the action of internal forces. Those protrusions, and the physical aspect of the country are so intimately connected with a great line of dislocation forming the eastern limit of the district, that this axis of disturbance, marked by the upheaval of the Abberley, Malvern, and May Hills, demands special notice. We trace it from the river Dee to the Severn, coinciding nearly with the ancient political boundaries of England and Wales, and even extending for some distance south of the Severn, as observed in the palæozoic upcast of the Tortworth district. It forms, in fact, for about 120 miles, the eastern boundary of a vast region of elevation, including Herefordshire, Wales, and a part of Ireland. Throughout the greater part of its course it partakes of the nature of a fault; the upheaved strata, which is commensurate with the amount of vertical dislocation between the two sides of the great fault at Malvern, being at least from 13,000 to 14,000 feet,—an "amount," says Mr. Strickland, "greater than can be paralleled in any other instance of a single fault which the world can produce."

An observer from the top of the Malvern syenitic ridge cannot fail to be forcibly impressed with the physical contrast of the country on either side of this line. To the west, the scenery is mountainous and picturesque, and belongs to the troubled palæozoic ages; to the east it represents an extended plain which has been subjected to comparatively little disturbance from subterranean forces, and is composed of younger marine strata. But the picturesque appearance of the elevated tract is only partially attributable to the dislocating forces which produced its upheaval. Our hills and dales bear witness to long ages of denudation, when ocean currents and rapid rivers gradually washed away vast masses of the upcast strata—here meeting with greater, there with less resistance, scooping out the valleys and leaving the hills as memorials of their power; thus laying bare for the astonished gaze of modern man those "tables of stone" upon which geologists have been able to read the history of the world during ages so incalculably remote as to be scarcely within the power of human mind to conceive.

While the upheaved region was thus subjected to the degrading action of water, its sedimentary matter was being incessantly carried to the mesozoic sea which occupied the downcast region to the east, aiding to supply that ocean bed with the materials for the successive deposition of the Triassic, Liassic, and Oolitic strata, in which again we witness the traces of long subsequent denudation in the valley of the Severn and the Cotteswold hills beyond.

It will thus be seen that while the elevated district to the west was constantly undergoing the process of degradation, the downcast to the east was being contemporaneously supplied with additional thickness of sedimentary strata. In conformity with this view we find the upheaved Carboniferous beds to the west, where they have withstood the denuding forces, occupying elevated situations on

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some of the highest hills; and it is difficult to behold the Coal Measures of South Wales and the Forest of Dean, with outliers of the same system capping "Old Red" at Pen-cerrig-calch on the top of the Black Mountains, and on the Clee Hills in Shropshire, without concluding that they are the remaining portions of a great mantle of Carboniferous strata which, at one period, must have stretched continuously over the Old Red Sandstone of this district; and in confirmation, it is interesting at several points on the axis of disturbance between May Hill and the Southern part of the Malvern Ridge, to observe the Coal Measures overlaying the Old Red, dipping rapidly eastward underneath the Triassic strata of the New Red series. It is evident that the convulsive movements which produced the upheaval took place after the deposition of the Carboniferous system, and prior to that of the Triassic. They are referred by Sir Robert Murchison (Silurian System, p. 131) to the close of the Permian epoch.

On the subject of igneous rocks, I may observe that our district affords some very interesting examples. I have already alluded to the syenitic ridge of the Malvern Hills—we there find the igneous mass assuming the various forms of granite, greenstone, hornblende, felspar, and serpentine, graduating into each other in perplexing compounds. A rock technically undistinguishable from gneiss is also abundant. This plutonic mass was protruded upwards in the form of a wedge, in a cooled or consolidated state, rising abruptly over the downcast area of Worcestershire, and throwing the strata on the Herefordshire side into every variety of contortion, actually overturning in some places the Silurian formations which rested upon it.

Some very interesting instances of trap occur in the area covered by the Old Red Sandstone. At Bartestree and Brockhill, crevices of dislocation have been filled by greenstone ejected in a fluid state from the plutonic region below, as evidenced by the heat-altered strata with which it is in contact.

The drifted clays or gravels of the County, and the fluviatile deposits of different ages are worthy of especial attention. They are found to contain the colossal remains of elephants, elks, hippopotami and other huge mammalia of extinct species. Through the kindness of Mr. Ballard we have here ocular proof of the fact.

I may now remark that, notwithstanding the fears and regrets with which I commenced the study of Geology, I think I have reason to congratulate the Club upon the extensive and highly interesting field for research which lies before it. We find ourselves in the neighbourhood of a fault of unequalled magnitude and grandeur, surrounded by evidences of active plutonic agencies, and our district embraces extensive developments of the Carboniferous, Devonian, and Silurian systems. The Silurian and Carboniferous formations by the laboriously minute researches of Sir R. Murchison, Professor Phillips, the officers of the Geological Survey, and others, are, with their fossil contents, pretty accurately known; but the Devonian, or Old Red, computed to be in this county at least 5,000 feet in thickness, is comparatively a *terra incognita;* and from the slowness with which

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its contents are yielded to the explorer, it is manifestly impossible, without the assistance of local geologists, for the distinguished men who occasionally visit our county, to bestow upon it that time which is necessary for the thorough investigation of the subject. I am inclined, therefore, to hope that by the contribution of such facts as may from time to time come under the observation of our Members, the Woolhope Club will be the means of throwing additional light on this system, which, in Scotland, Hugh Miller has proved to be so rich in ichthyolites of surpassing interest; and the prospect of success is so far encouraging from the fact that in almost every quarry of Old Red Sandstone in the vicinity of Hereford I have succeeded in disinterring fragmentary remains of vertebrata, namely ichthyodorulites, and other bones of fishes.

The Chairman, amid applause, presented the thanks of the Meeting to Mr. Scobie for his excellent essay.

The weather being by this time somewhat less inclement than it had been during the forenoon, the Members started for Stoke Edith Park, under the guidance of Mr. Robertson. After having been much gratified by an examination of the well-kept gardens, and the splendid collection of stove and greenhouse plants, the Members ascended the ridge behind Stoke Edith House, and proceeded through the woods to the Woolhope valley of elevation. They first visited the quarried escarpment of Wenlock limestone, at Dormington Wood, and the landslip so rich in fossils and corals; and subsequently made their way across the various minor ridges around the central dome, visiting successively Littlehope and Scutwardine quarries. The skiey influence being still most adverse, they were obliged to postpone their intended visit to Woolhope itself; and in the midst of a heavy thunderstorm bent their course to the Green Man Inn, at Fownhope. Here they were joined by Mr. R. Johnson, of Hereford; and the party of fatigued and hungry philosophers discussed with evident relish a new class of subjects in the shape of an excellent dinner provided by Mr. Connop. After the removal of the cloth, the health of the Queen was given from the Chair, and was succeeded by "better health to the respected President." The health of the Hon, Secretary was drunk, and neatly acknowledged, as were also the healths of the Rev. Chairman and the Rev. Messrs. Hill and Holmes (of Eldersfield), who had travelled a distance of twenty miles in order to be present that day. The Rev. gentlemen severally returned thanks, expressing their gratification at the proceedings of the day, and their readiness to aid the operations of the Club. The health of Mr. R. Johnson having been drunk, the Chairman gave "Success to our next Meeting," which was drunk with applause. Mr. Purchas and Dr. Bull having undertaken to draw up a report of the botanical, and Mr. Scobie a similar report of the geological proceedings of the day, the company separated about 8 p.m., each expressing his conviction that, in spite of pluvial difficulties, the day had been spent most agreeably and instructively.

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, JULY 20TH, 1852.

The Second Field Day of this Club for the present (its first) season was held on Tuesday, July 20th. The district of country selected was not only of great scientific interest, but of surpassing picturesqueness; and the unbroken fineness of the day in agreeable contrast with the intermitted rain of the first day of meeting, heightened the natural beauty of the district, while it afforded abundant opportunity for carrying out the scientific objects of the trip. Altogether the meeting was a highly successful one; a delightful mingling of amusement with instruction.

At seven o'clock a.m., a party of nine members, residents in Hereford, started (in a stage coach, supplied for the occasion by Messrs. Bosley) for the village of Whitchurch, midway between Ross and Monmouth. At Harewood End they were joined by Mr. R. M. Lingwood, the esteemed President of the Society. After a pleasant ride of 16 miles in the balmy air of the morning, the fierce heat of July being tempered by a cloudy sky, the party reached Whitchurch shortly before nine o'clock. Here they were much gratified to find, already arrived, several of their most distinguished honorary Members: Sir Roderick I. Murchison, F.R.S., F.G.S.; Mr. H. E. Strickland, F.G.S., Lecturer on Geology to the University of Oxford; and the Rev. P. B. Brodie, F.G.S, of Foleshill, Warwickshire. Shortly afterwards other members arrived and the routine business of the Club was proceeded with. Two new members having been admitted, the Hon. Secretary, Mr. M. J. Scobie, F.G.S., of Hereford, read the subjoined invitation which he had received from Mr. R. Blakemere, to visit his estate at the Leys, but which the Club had been unable to accept:—

THE LEYS, MONMOUTH, 9th July, 1852.

SIR,—I beg to say that it will afford me much gratification to render my Doward Hill, the iron tower upon it, and the grounds attached to it, accessible to yourself, and to the Members of "The Woolhope Naturalists' Field Club" on the visit you have requested to be allowed to pay to them on the 20th inst, for the purpose of making geological and botanical investigations.

Allow me to add that should my state of health permit me personally to receive the visit, I shall have much pleasure in doing so, and in drawing the attention of the visitors to some interesting localities connected with the objects of their pursuit.

I have the honour to be, Sir,
With much respect,
RICHARD BLAKEMERE.

To M. J. SCOBIE, Esq.

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It was resolved that the Hon. Secretary be requested to convey to R. Blakemere, Esq., the thanks of the members for his kind invitation, and their regret that they found themselves unable to accept it. A member of the Club had also received for the party an equally kind invitation from Captain Meyrick to visit Goodrich Court and Castle; but this also had to be declined for want of time.

A viper preserved in spirits of wine, which had been caught in May last in Barrett's wood, near Tyberton House, in the parish of Madley, and had been forwarded by Mr. T. H. Lee Warner, was handed round for inspection. The brief accompanying note stated that it had been killed by giving to it a pinch of tobacco. The generic character, as given in Bell's "Reptiles," is: "Head depressed, oblong, ovate, somewhat compressed before, and wider behind the eyes; vertex covered with scuta; no pit between the nostrils and the eyes; tail with double plates beneath." The colour of this reptile is yellow, with a dark zigzag line down the back; but there are also red and black vipers. The eye of the viper differs from that of the snake in the pupil being placed in a straight line leading from the top of the head downwards. Mr. Strickland explained that both red and black vipers were the same species at different stages of growth. The excrescences near the end of the tail, about which some doubt was expressed, were the male reproductive organs developed in the breeding season. Thanks were voted to Mr. Lee Warner for his communication.

The Hon. Secretary laid on the table some fragments of a deer's horn, and of a bone of an ox, which had been found at a depth of 20 feet beneath the surface, in the silt deposit on the southern bank of the Wye at Hereford, in the course of the excavation for a pier of the Newport, Abergavenny and Hereford Railway Bridge now in course of erection. The bones had been handed to him by Mr. J. S. Davis, of Broad Street, in this city. Mr. Strickland remarked that these bones were of comparatively recent date, the polish on their surfaces indicating that there was a considerable amount of gelatine still remaining in them. Upon losing their gelatine bones became rough and porous on the surface.

The bones, tusks, &c., found in the parishes of Bosbury and Withington in 1843, during the formation of the Hereford and Gloucester Canal, which had been brought for inspection by Mr. Ballard, excited much interest. Sir R. Murchison and Mr. Strickland explained that some of the large bones which had been supposed to belong to the rhinoceros or hippopotamus, were femur and other bones of probably the Bos Urus, or bison; the vertebræ and skull in the collection were those of an animal of the deer species, probably the red deer. The collection also included teeth and portions of tusks of the elephant. These remains were the more interesting from the fact that so few mammalian remains have been hitherto found in the drift of Herefordshire.

The company, having breakfasted, started about half-past ten o'clock upon their pedestrian excursion. The points to which they first directed their course were the quarry and limekiln at the north-eastern base of Doward Hill, at which place the Mountain or Carboniferous limestone is laid bare. After spending a

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short time in searching for fossils, the party crossed the Wye at the adjacent ferry, and then turning to the right, ascended to the summit of the luxuriantly wooded limestone range known as Coldwell Rocks, and proceeded to the well-known Symond's Yat (or gate). The magnificent view from this spot, which forms the narrow neck of a lofty rocky promontory washed on three sides by the Wye, is too well known to need more than a passing allusion, but in a geological aspect the scene was particularly interesting. Standing on the limestone ridge which forms the edge of the Forest of Dean, to the eastward the eye ranged over a wide champaign of the Old Red Sandstone, bounded in the distance to the east by the syenitic peaks of Malvern and the oolitic ridges of the Cotteswolds. To the south stretched the coal measures of the Forest basin; and thus, at one view, the eye embraced strata of widely different dates. From the Old Red Sandstone in which the highest type of animals was fish, and the only vertebrate fish were of species allied to the shark, down through the long ages of the gradual deposition of immense masses of limestone—the intervals of violent volcanic action, when masses of molten matter were forced through the existing strata—the long succession of forests which grew, were successively submerged and covered with sand, the mass again elevated to become the soil of new forests, and again plunged into the ocean depths and buried beneath sand and mud, to be there converted into fuel for the use of mankind—the gradual formation, above the Carboniferous strata, of the New Red Sandstone, the Lias, and the Oolite, with their myriads of animals of higher types than any which had previously appeared —all were epitomised to the eye by these salient points of the landscape.

Some time having been devoted to this fascinating spot, Mr. Strickland and a number of the party proceeded southward along the road to Coleford. On their way, Mr. Strickland pointed out the millstone-grit rock, which forms the inner edge of the coal basin. The party made their way to Christchurch, where they visited several pits, receiving from Mr. Strickland much interesting and valuable information in regard to the vegetable remains, which are so abundant in the shales and coal seams. Fragments of Sigillaria, and other extinct vegetation, were found by several of the party in the débris lying about the mouths of the pits. Mr. Strickland notices the fact that scarcely any remains of air-breathing land animals had been found in the coal measures; a circumstance which was probably due to the great excess of carbonic acid in the atmosphere at that remote period. The vegetation which then flourished being of genera, the analogues of which now live chiefly in the torrid zone, it had been concluded that the heat of the earth in the periods when these forests grew was very great; and that circumstance, combined with the excess of carbonic acid in the atmosphere, would cause a most luxuriant growth of vegetation. Vegetables might be said to be constantly engaged in producing carbon. From the atmosphere they drew it by decomposing the carbonic acid; and then, passing into the state of peat, and from peat to coal, they became a depository of carbon. When the coal was drawn from the earth for the use of man, part of the carbon passed off as carbonic acid gas into the atmosphere, to be thence again drawn by plants, again stored up in the earth as coal, and again liberated by combustion as before. The theory that these coal fields were

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deposits of vegetation in lakes or estuaries is strengthened by the circumstance that a bed of whitish mud or shale is found under every one of the seams in South Wales, a vast coal field, the limestone edge of which was visible from that spot. This white mud or shale is found to be similar in its nature to the deposit of mud which was found at the bottom of lakes and pools when they were dried up. The inference is that every one of the many coal seams of South Wales was formed in a similar position; that the mass was then submerged, and again becoming dry land, was elevated, and became the site of a fresh deposit of vegetation. In many cases trees were found erect in the coal beds, a fact which showed that they had been buried on the spot where they had grown. The position of parts of the carboniferous strata on the summit of the Black Mountains, and on other elevated spots, rendered it probable that the whole surface of Herefordshire was once covered with carboniferous strata to an immense thickness, which were broken up by convulsions of the earth, and swept away by the action of water. This process of degradation by water is still going on: the Wye is constantly carrying down into the Bristol Channel, and thus to the ocean, portions of the limestone and other rocks through which it passes; and the mass is accumulating in the Atlantic, above the remains of similar rocks, which have been thus carried away in past ages.

Leaving the coal pits of Christchurch, the party retraced their steps to Symonds Yat, and, descending the slope of the promontory, reached the very striking outcrop of the Conglomerate, which lies between the Mountain Limestone and the Old Red Sandstone. This formation (Mr. Strickland explained) was composed of rounded fragments of quartz, greenstone, jasper, &c., which had been deposited in the mud of a turbid ocean. The quartz is what is called *vein quartz*, and many of the pebbles contain with it portions of the rock in which the quartz vein was formed. In some cases this is a chlorite schist. An interesting circumstance was here noticed: a longitudinal fissure in the rock, 20 feet in length, was partly occupied by one of the roots of an oak, which had grown down in search of moisture; and partly by a stalagmite, or deposit of carbonate of lime from water. Mr. Strickland explained that the formation of stalagmite was identical with the process called "petrification."

The party now returned across the Wye to Whitchurch, on their way to the inn, noticing a curious instance of the power of vegetation to accommodate itself to altered circumstances. A poplar tree having fallen or been blown across a small pool, the branches continue to grow along the upper side of it; but instead of preserving the curved direction towards the summit of the tree, which characterises the species, the branches all shoot straight upwards, and therefore at right angles to the stem.

Throughout the pleasant ramble, some of the party devoted their attention in part to the botany of the district. The equally rare and beautiful Bee-orchis; the Small St. John's Wort *(Hypericum pulchrum)*, the Canterbury Bell *(Campanula latifolia)*, the Scrophularia nodosa, and other more common plants, were found growing abundantly. As, however, the presence of the distinguished

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visitors gave the excursion a turn chiefly geological, the botany of the spots visited may be said to have been left almost unexamined.

At 4 p.m., the explorers assembled to a substantial dinner at the Crown Inn. The President of the Club, Mr. R. M. Lingwood, presided at dinner; Mr. M. J. Scobie, the Hon. Secretary, officiating as vice-chairman. The company also included Sir R. I. Murchison, Mr. Strickland, Rev. P. B. Brodie, Rev. T. T. Lewis, Bridstow; Rev. W. S. Symonds, Pendock; Rev. R. Holmes, Eldersfield; Rev. A. Kent, Minor Canon of Gloucester Cathedral; Dr. Gilliland, Dr. Lingen, Dr. Rowan, Mr. Johnson, Mr. Cam, Mr. Stone, Mr. DeBoinville, Mr. Otte, Mr. Ballard, Mr. A. Thompson, and Mr. Flavell Edmunds.

The cloth having been removed, the Chairman gave the healths of the Queen, Prince Albert, and the Royal Family, which were duly honoured.

The Chairman then gave the health of "The Honorary Members," coupling with the toast the names of Sir Roderick Murchison, Mr. Strickland, and Mr. Brodie, whose presence at that Meeting the Members felt to be a great honour and privilege. (Applause).

Sir R. I. Murchison, in acknowledging the compliment, said that he felt the greatest interest in Herefordshire, as the County which had furnished so many important facts for the development of the Silurian system; and he was therefore much gratified to find that a Club had been formed for the further investigation of the geology and natural history of this interesting county. He almost considered himself a Herefordshire man, for another reason. The company was aware that there was a regiment called "the 36th, or Herefordshire Regiment." As a young ensign in that regiment at the age of 16, he had the honour of carrying a colour at the Battle of Vimiera. The Duke of Wellington was just behind them at the charge, and expressed himself delighted with the steadiness of the men in making it. His Grace, in fact, devoted a whole paragraph in one of his despatches to a description of that charge; a compliment which he has paid in no other instance to the charge of a single regiment. Two-thirds of the men in the 36th at that battle were actually natives of Herefordshire. This old reminiscence had just occurred to him, and he mentioned it as one of the reasons why he felt such an interest in this beautiful county. (Applause).

Mr. Strickland begged also to return thanks for the honour conferred upon him. He felt great interest in the Club, and thought, as it had come into the world so healthy and vigorous, they might be interested to learn something of its parentage. The first Club of the kind was established at Berwick; and, as it had proved very useful, the idea was adopted by some gentlemen in Gloucestershire. The Club which they formed was called the Cotteswold Club; and its labours had been the means of aiding greatly in the investigation of the natural history, &c., of the Cotteswold range and its vicinity. He was happy to find that the Woolhope Club, its sire the Cotteswold Club, and its grandsire the Berwick Club, were all flourishing and useful; and he hoped that similar institutions would be formed in other counties. Perhaps one means of assisting each other's progress would be for

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each Club to fix a meeting, say once in a season, on the confines of their counties, where they could become acquainted with each other, and interchange the fruits of their enquiries. They, as Herefordshire men, had been that day, strictly speaking, poaching upon another manor, since they had been into Gloucestershire; and he would suggest that next season a meeting be appointed for May Hill, or some other spot near the border, where the Cotteswold Club could meet them. (Applause).

The Rev. P. B. Brodie returned thanks, expressing his approval of Mr. Strickland's suggestion.

The Chairman then called upon the Hon. Secretary to read the papers which had been prepared. The first of those read was

THE GEOLOGICAL REPORT OF THE PROCEEDINGS AT THE FIRST EXCURSION OF THE CLUB,

On Tuesday, May, 18th, 1852, by M. J. Scobie, F.G.S.

The Rev. Reginald P. Hill, of Cradley, exhibited a specimen of Caradoc Sandstone, containing the characteristic fossils curiously altered by heat. This specimen was from the Malvern Hills, where the Caradoc formations are at various points associated with trappean rocks, which, at a very early period, must have been erupted in a state of fusion, altering the strata through which the volcanic matter had forced a passage. Here it may not be unworthy of remark that there is no instance throughout the district of a similar metamorphosis having taken place from contact with syenite, the foundation rock of the Malvern range. We may hence justly infer that the latter was consolidated previous to the deposition of the superincumbent sedimentary strata, under the pressure of an ocean of considerable depth.

A collection of Mammalian remains discovered by Mr. Ballard, of Hereford, during the formation of the Herefordshire Canal, in gravels of various kinds, was then submitted for examination. It has been a subject for remark that our superficial deposits are peculiarly destitute of Fossil Mammalian remains, and it is therefore gratifying that our first Meeting should have been instrumental in throwing some light upon a subject which has hitherto remained in obscurity. The elucidation of these gravels presents an ample field for the researches of an intelligent geologist, and it is to be hoped that they will receive that amount of attention at the hands of the Club which their importance demands. It is only by a careful examination of their constituents, fossil contents, manner of distribution, and relative elevations, that the periods of their deposition and origin can be ascertained.

Sir Roderick Murchison divides the gravels of England into two classes. The first includes all those coarse and sometimes far-transported fragments to which some geologists apply the word "diluvium," but which, to avoid misconstruction, he designates *drift*; and this drift he subdivides into three distinct

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varieties, two of which he terms *local*, the third *foreign*. "The drift of the high lands of Siluria" (to quote from "Silurian System," p. 510), "is of the earliest date, and was produced by the elevation of the older rocks. The next in age arose from the upcasts of the various coal measures; and the third or most modern drift is that which covers large portions of the central countries, and contains boulders of northern granite, all which detritus was accumulated beneath the sea during successive epochs. The *second* class of "alluvia" includes all the deposits formed in lakes and river courses since the elevation of the districts from beneath the sea; also the masses of travertine formed by calcareous springs and the various results of atmospheric action."

As we have no evidence in the district west of the Malvern Hills of the deposition of any rocks more modern than those of the Palaeozoic ages, it is evident that some of our gravels may be of very high antiquity.

But to return to our fossils. Bones and teeth referable to the mammoth and the deer were distinguishable from others which, on closer examination may prove to belong to the hippopotamus, bos urus, or bison, and the hog. Important and suggestive facts! Has the climatal system of the earth, it may be asked, undergone a change since these dry bones lived and moved, the denizens of this land? The representatives of some of these mammals are in our day confined to the swamps and borders of certain tropical rivers, or at least to countries within the torrid zone.

From the wonderful adaptation to particular spheres of enjoyment which characterises the various families of the animal kingdom, it seems just to argue that, when those extinct creatures were indigenous and roamed the forests and sported in the waters of this northern latitude, the conditions under which they lived were analogous to those in which similar families exist in the present day. But this is not the conclusion to which our most eminent geologists have arrived. Huge pachyderms are known to have existed during the glacial epoch, and Sir Charles Lyell and Professor Owen have explained the capabilities of these animals to sustain the hardships of a cold climate equal in intensity to a Siberian winter.

The weather having partially cleared up towards one o'clock, the investigations of the day commenced on the interesting grounds of Lady Emily Foley, where our party divided, geologists and botanists taking separate routes.

Near Tarrington were observed some examples of Downton Sandstones at the base of the Old Red System, but not in actual contact with it, the junction beds being obscured by superficial accumulations.

In ascending the hill at Stoke Edith, our party crossed the Upper Ludlow shale, and upon attaining the summit, recognised a ridge of Aymestry rock, a formation one step lower in the Silurian series. In ascending the hill, however paradoxical it may sound, we had, geologically speaking, penetrated deeper into the earth's crust. Palaeontologically, we had receded to a period when, ere the fiat had gone forth calling a higher order of beings into existence, invertebrata ap-

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pear to have been the sole inhabitants of the deep. We had now arrived within view of the Woolhope "valley of elevation." So great has been the labour bestowed upon this remarkable region by Sir Roderick Murchison, Professor John Phillips, and other eminent geologists, and so copious is the information already before the public, that our object in visiting it was rather to launch our bark and proceed to our voyage from a port of such world-wide celebrity, than to entertain much hope of making any fresh discoveries. The Woolhope Valley of Elevation, admitted to be the most symmetrical of its type in Great Britain, is described by Mr. Strickland as an "elevation crater, in which we see the ineffectual struggles of a focus of volcanic energy to burst through the superincumbent strata." That this energy was directed towards a single point is evident, for we find an unbroken succession of Silurian strata from the Caradoc to the Old Red Sandstone, dipping on all sides from a common centre at angles of 15 to 70 deg. The area occupied by the upcast Silurian strata extends from Dormington on the N.W. to Gorstley Common on the S.E., a distance of about ten miles; and from Fownhope on the S.W. to Putley on the N.E., about four miles. A semicircle described from Fownhope to Putley, through the villages of Mordiford, Dormington, and Tarrington, with convergent lines from the extremities of the arc meeting at Gorstley Common, would embrace the whole district, the general outline of which resembles a boy's kite, or a pear tapering towards Gorstley Common, which part Sir Roderick Murchison designates "the stem."

The manner of upheaval, and the denudation to which the district has been subjected, are strikingly manifest in the physical character of the country. We perceive a central elliptically shaped dome encircled by two narrow ridges of hills attaining their greatest altitudes towards the north; Seager Hill, in the exterior circle, being 892 feet above the sea, while the elevation of a nearly corresponding point of the inner circle at Devereux Park is about 650 feet, or somewhat lower than the central dome. In the "Memoirs of Geological Survey," Professor Phillips gives the following graphic description of the upcast region:—

"The internal structure corresponds most accurately with the external configuration. The central dome is composed of the lowest strata, viz., Caradoc Sandstone, overlaid by Woolhope Limestone; the concavity around it is sunk in the Wenlock Shales; the inner ring of hills is formed by the outcrop of Wenlock Limestone; the hollow which encircles it, of the Lower Ludlow Shales; and the outer chain of high ground which borders and overlooks the whole of this singular district is a ridge of Aymestrey Rocks and Upper Ludlow flags and shales, dipping everywhere from the centre towards a wide area of the Old Red Sandstone."

There can be no doubt that, previous to the convulsive movement of which I have spoken, the whole country was continuously overlaid with Old Red Sandstone, and that again by Carboniferous strata; but during long ages of submergence, the wreck of those systems has been swept away along with immense masses of the upcast Silurian formations. So complete was the work of denudation, that not a fragment of Old Red or drift of any description can be detected in the valley.

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The Faults which here occur deserve attention, not being the least interesting phenomena which present themselves to puzzle young geologists; the most considerable of these, which runs from Mordiford for some distance in the line of the Pentelow Brook to near Tarrington, cuts off a portion of the Woolhope Limestone and Caradoc Sandstone from the central dome, and as it has the effect of depressing the strata towards the north, brings these formations into contact with Wenlock shale, and at the Gorge near Mordiford places the Ludlow rocks in opposition to Old Red Sandstone. Another fault, which runs in a northerly direction east of Old Sutton and Prior's Frome, depresses the strata to east, and produces in its course a double ridge of Aymestrey rock.

The gradual percolation of water through the Ludlow rocks, which are much interlaminated with argillaceous bands, and which occupy elevated situations to the north and north-east, has occasioned landslips of considerable magnitude. That near Dormington, which took place in 1844,* was visited by our botanical party. "Adam's Rocks," on the southern slope of Backbury Hill, and "The Wonder," near Putley, are also interesting examples of similar displacements.

Descending the southern slope of Stoke Hill we crossed the excavated trench of Lower Ludlow shale already alluded to, to the quarried escarpments of Wenlock Limestone at Dormington Wood. The scene presented at this interesting spot is of a character to strike the most casual observer with awe and astonishment. Buried and embalmed in solid rock, of which they may be said to form the mass, are seen the remains of millions of the early invertebrate inhabitants of our planet. Not to speak of myriads of encrinital, molluscous, and conchiferous remains, the beautiful corals of the formation are in such vast abundance that, to the mind's eye, a modern tropical reef seems realised; imagination pictures its millions of polypi stretching forth their tiny arms in their native element, revelling in the enjoyment of that peculiar and beautiful principle of life, which, animating individually, and vibrating through the mass, associated them together in a common bond of unity. After leaving Dormington Wood, our party were subjected to a terrific and uninterrupted storm of thunder, lightning, and rain. Our progress consequently being hastened along the line of fault, through the romantic glen of the Pentelow Brook, and from thence to the Scutwardine Quarries of Woolhope Limestone, we arrived at Fownhope at four o'clock. There the Members dined together according to appointment, and separated late in the day, after expressing many hearty wishes for the prosperity of the Woolhope Club.

CONTINUATION OF THE PROCEEDINGS OF THE SECOND FIELD MEETING.

The health of the Hon. Secretary was drunk, Mr. Strickland expressing his earnest hope that so valuable a report as had just been read would not be lost, but be printed and circulated, for the information of other Clubs and the scientific world generally, and that it might be handed down to posterity.

The President was sure Mr. Strickland would be gratified to learn that the Rules of the Club contemplated the printing of the papers submitted to it.

* See *Hereford Journal* March 20th, 1844.

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FOSSILS.

Mr. Otte produced a small slab containing a specimen of graptolite—the skeleton of a fish resembling the pen-fish of the tropics—from the Woolhope Limestone.

A remarkably perfect specimen of the trilobite, called Bumastus Barriensis, coiled up like a hedgehog, which had been lent by Mr. Hodges, of Ledbury, was produced, and excited much interest. The thanks of the Club were voted for the loan of this valuable specimen.

BOTANICAL REPORT.

By Dr. H. G. Bull.

The President then read Dr. Bull's Report of the Botanical Observations made during the former excursion. Having briefly described the visit to Stoke Edith Gardens, the Report noticed that in proceeding through the park to the landslip, the Orchis Morio, Saxifraga granulata, Pteris aquilina, Chenopodium Bonus Henricus, Potentilla verna, and many other common plants were gathered. On descending the hill, the party found the Helleborus foetidus in two situations, apparently indigenous. After crossing the Pentelow Brook, they found the Aquilegia vulgaris, Viburnum Lantana, Viola hirta (in seed), Habenaria bifolia (probably H. chlorantha, but the flower had not yet opened), and occasional trees of Pyrus torminalis. On the Wenlock Limestone, around the rubbish from the lime-kilns, were Cynoglossum officinale, Lithospermum officinale, &c. ; while the luxuriant foliage of the Clematis Vitalba, covering the hedge, and the fresh green plants of Dipsacus sylvestris attracted attention. The report then proceeds:—Descending the Wenlock ridge, through the quarries on to the Wenlock shale, the Valeriana dioica, Convallaria majalis, Paris quadrifolia, Allium ursinum, Listera ovata, were found growing plenteously; there were some plants of Daphne Laureola; and here, too, was gathered Luzula Boreri, probably not uncommon, though as yet but little known. The Luzula sylvatica, so common in the south and other parts of the county, was not once noticed. The Epipactis ensifolia grows freely amongst the underwood on the Caradoc Sandstone, but its locality is very limited in extent; upwards of thirty plants were observed in 1851, all growing on the right hand side of the high road leading to Woolhope, just below the brow of the hill in the Haugh Wood. The locality is about fifty yards in length, and does not extend above ten or twelve yards into the wood. P.S., June 9th, 1852. The plants are still more numerous this year, and a little more spread out; nearly 300 were in flower, and two or three were observed on the left-hand side of the road. At the foot of the hill at the village of Mordiford, the Helianthemum vulgare grew freely on the south bank; and on a bank on the opposite side of the road, on the roots of the Acer campestris, grew the parasite, Lathræa Squamaria, now in seed, but always interesting from its peculiarities.

The general botanical character of the district is wooded, the slopes and ridges being covered with underwood, consisting for the most part of oak, ash, hazel, dogwood, meal-trees, elder, blackthorn, hawthorn, &c., cut at regular

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intervals for poles, firewood, &c. The valleys contain hamlets, or scattered houses, with small orchards or open meadows, affording a pleasing variety in the botany as well as in the scenery.

Throughout the route taken there was an abundance of the Mercurialis perennis, Hyacinthus non scriptus (one plant with pinkish flowers), Stellaria Holostea, Euphorbia amygdaloides, Galeobdolon luteum, Carex sylvatica, and the universal Carex recurva. The Polygala vulgaris (blue, pink, and white varieties), the Colchicum autumnale, now pushing up into seed vessels, grew freely in the valleys; Anemone nemorosa, with many more ordinary plants. The wild Bird-cherry, Prunus Avium, so often constituting a beautiful object in the woods of the southern part of the county, was not observed.

Here followed an accurate list of all the plants observed in flower during the day named, according to the London Catalogue.

ABUNDANCE OF AVENA FLAVESCENS AT ROSS.

By W. H. Purchas.

At the request of the Secretary, Mr. Edmunds read the following communication from Mr. W. H. Purchas, of Ross, who was unfortunately prevented by indisposition from being present:—

My attention has frequently during the last few weeks been drawn to the peculiar silky appearance of the fields of mowing grass around Ross, due to the unusual prevalence of the yellow oat-grass (Avena flavescens). It seems a trifling circumstance to mention, but as small facts in natural history often turn out to be important ones, I have less hesitation in briefly drawing the attention of the Club to it. Like other British perennial oat-grasses, Avena flavescens flourishes in dry situations, and produces very few and weak leafy shoots—bottom grass, as the farmer terms them. Hence these grasses are of little value for cultivation, and from their slow growth will readily be overcome by more vigorously growing kinds. The unusual plenty which I have mentioned is, I think, readily explained by the remarkable drought during the spring months of this year, which, while it retarded the growth of the more luxuriant pasture plants, supplied the precise conditions required for the healthy growth of the yellow oat, and prevented it being stifled and overrun, thus having the double effect of a stimulus and a safeguard.

It may not be amiss to mention to the Club that I had, on the 12th instant, the pleasure of making an addition to the list of South Herefordshire plants by finding, near Hope Mansel, Pyrola minor—a single plant, and also a Silene, which I think will turn out S. noctiflora, but the specimens are scarcely forward enough to warrant a positive statement. I also found, near the same spot, new stations for the elegant fern Polypodium Dryopteris, and for the Dutch rush, Equisetum hyemale, remarkable for the abundance of silex in its stem, which renders it useful in polishing wood.

Ross, July 17th, 1852.

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On this communication, Mr. Edmunds remarked that the grass alluded to is said to be distasteful to cattle, although sheep are very fond of it; and perhaps its unusual prevalence in this instance may have been partly caused by cattle having been turned into the meadows early in the season. If they rejected the Avena, while they cropped the other grasses, it would naturally be in excess of them at the time of flowering. He merely threw that out as a conjectural cause in addition to the drought as suggested by Mr. Purchas.

THE CIRL BUNTING; THE NIGHTINGALE, &c.

The President, referring to the excellent remarks of the Rev. W. S. Symonds, at the former meeting, as to the desirableness of members noticing every circumstance bearing upon the natural history of the district, observed that he had this year noticed a bird rare in this county, the cirl bunting, a bird resembling slightly, but somewhat larger than, a yellow-hammer. The fern-owl, too, had become much more common this year in his neighbourhood than had previously been known, somewhat to the alarm of the old women. (Laughter).

The Rev. W. S. Symonds wished to know how far westward the nightingale s range extended.

The President did not know how far westward, but to the south-west he believed the neighbourhood of Abergavenny was the limit. He might add that in his neighbourhood the nightingales had been more numerous this year than for many years past. He believed that in this county they were mostly heard in the valley of the Wye.

DECOMPOSITION OF SULPHURETTED HYDROGEN BY HEREFORDSHIRE MARL.—THE CHOLERA.

THE ORIGIN AND USE OF PEROXIDE OF IRON IN THE OLD RED SANDSTONE.

By Dr. Rowan.

After briefly adverting to the importance of its bearing upon agricultural chemistry, Dr. Rowan proceeded:—

Finding myself located upon the Old Red Sandstone formation, whose agricultural character does not rank so high as other and more recent deposits, I was anxious, if possible, to go beyond what I found written in books, to discover the true chemical elements of which the strata was composed, with a view to the determination of what the soils might derive from the ancient rock, out of the débris of which they were formed, and by ascertaining of which elements the rock was deficient, to suggest the best mode of supplying that deficiency. In the course of this investigation two things were manifest, namely, a great abundance of peroxide of iron, and a deficiency of phosphoric acid. The latter I attribute to the scarcity of fossil remains, and to the fact that those fossils that are discovered are the remains of fish, the bones and scales of which are composed chiefly of the carbonate of lime, and not, like the reptilia and mammalia, composed of the phosphate of lime.

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With regard to the peroxide of iron, it became an interesting subject of inquiry :—By what acid was it originally held in solution, before it was deposited in this interesting formation? Could it be nitric, hydro-chloric, or sulphuric, or was it originally dissolved by the aid of carbonic? The absence of nitrogen, and the very small portion of chlorine and sulphuric acid (merely a trace), compared with the abundance of base, at once determine that the first three acids could not have been the solvents, and there was every reason for the supposition that carbonic acid was; but by reasoning from analogy, and considering that where iron was held in solution by this acid as in chalybeate springs, its instant exposure to the atmosphere deprived it of the carbonic acid, producing a deposit of peroxide of iron—this, I admit, would be a fatal objection to this theory, provided that we could prove the constitution of the atmosphere, during the existence of those early seas, was the same as it is at present. The constitution of our atmosphere apart from carbonic acid and aqueous vapour is—

71 oxygen, and 21 nitrogen; or
77·50 nitrogen gas,
21·00 oxygen,
1·42 aqueous vapour,
0·08 carbonic acid.

Although there is a constant quantity of carbonic acid evolving from decaying vegetable matter, yet the quantity of the different elements of which atmospheric air is composed varies but little on any part of the globe. But geologists consider (and indeed with great plausibility) that the atmosphere which surrounded our globe before the Carboniferous era, must have contained a much greater proportion of carbonic acid than it does at present, so much so, as to be incapable of supporting animal life, except that of the lowest scale; and instead of abstracting carbonic acid, the atmosphere was one of the greatest sources of its supply. The growth and development of the vast forests (which afterwards became submerged, and by the influence of heat and pressure became our present extensive coal fields, which is in reality, the basis of our national wealth, for without our coal fields our steam engines would be powerless—our railways could not exist—our iron works would languish—our cotton factories would never have attained to their present position, and all our other great manufacturing speculations of wool, flax, silk, &c., would be in weakness and decay) were the cause of the abstraction of the super-abundant carbonic acid from our atmosphere, and subsequently fitted it for the use of every class of air-breathing animals. That carbonic acid does hold in solution peroxide of iron, we have abundant proof, in the chalybeate springs found in various parts of this island, and, indeed, in our own county. I analysed, some years ago, a spring of this sort, belonging to the late Mr. Burnham Pateshall, of Allensmore; it contained a quantity of iron, held in solution by carbonic acid, together with lime and magnesia. I have also found it in water passing through a meadow belonging to Mrs. Powell, situated near the road leading from Hereford to Ross, about a mile and a half from Hereford, and doubtless it occurs in many other parts. This fact has been doubted; but to me, considering the nature of the substance, it is rather a wonder that chalybeate springs are not more frequently found. Mr. Hugh Miller, in his work entitled "The Old Red Sandstone," in relating

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the fruitless attempt of some miners in searching for coal, in Cromarty, by boring, states that they found a true artesian well, which put a stop to their labours; and although the waters were not strongly tinctured with ferruginous matter, yet he could see every pebble and stalk over which the water passed, enveloped with a ferruginous coagulum. I can easily conceive that, before the carboniferous era, the atmosphere, surcharged with carbonic acid, supplied the early seas with a sufficient abundance of that gas to hold in solution the iron, lime, magnesia, &c.; that the latter elements were partially used up by the fish, with which those early seas abounded, and as the purification of our atmosphere proceeded, the iron, parting with its double dose of carbonic acid, gradually departed, giving to the formation its peculiar red tinge, by which it has acquired its name, the Old Red sandstone.

Thus whilst it is interesting and useful to trace (if possible) the source of such combination of elements as the peroxide of iron, there are often other considerations arising out of the investigation, of equal importance to the student of natural philosophy. Herefordshire, for instance, has been proverbial for the salubrity of its atmosphere, and the freedom of its inhabitants from those epidemic scourges which have so often depopulated districts resting upon other geological formations; and it is a remarkable fact that, in the two visitations of cholera, not one case occurred in the county. Now, it becomes an interesting question—Is there anything peculiar to the Old Red sandstone, which would in any way contribute to this exception? The faculty have long been accustomed to consider that cholera follows the track of typhus, and that typhus is often occasioned by gaseous emanations arising from the decomposition of animal and vegetable matter; but in what way such effects are produced, science has not as yet been able to determine. Whether by producing a change in the electrical state of the atmosphere it induces disease (Sir James Murray), or by being taken into the lungs, it produces a peculiar chemical change in the constitutents of the blood, thereby inducing morbid action. During the progress of some chemical investigations upon the properties of sewage water from thickly inhabited places in this county, I was surprised to find that its composition varied materially from that stated by other analysts in other localities; and I was led to inquire whether there was any peculiar property possessed by the soil of the district which would account for the difference. Knowing the composition of the soils, and the quantity of ferruginous matter they contained, and being aware that when solutions of any salt of iron were placed in contact with sewage, the whole of the iron would be precipitated as an insoluble sulphuret, it remained then to be proved whether the finely divided peroxide of iron would act analogously to the solutions of its salts, which, indeed, by direct experiments, I found to be the case; and the play of affinities were as follows—the sulphur of the sulphuretted hydrogen, combined with the iron of the peroxide, forming the metallic sulphuret; the liberated hydrogen combining with the liberated oxygen of the peroxide, forming water; thus the most deadly compound gas, by transposition of its elements with peroxide, was converted into two most innocuous compounds, water and the sulphuret of iron, and the sulphuret again, by exposure to the atmosphere, became re-converted into the peroxide of iron, with liberation of sulphur, not again to be converted into the deadly sulphuretted hydrogen, but into the useful sulphuric acid. From the above con-

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siderations, if the premises and conclusions are correct, we have proof of the wisdom and beneficence of that great Creator, who has created nothing in vain; and the more we enter into the minutiæ and detail connected with His works, and the laws by which they are governed, the more fully convinced shall we be that not only do the Heavens declare the glory of God, and the firmament shew His handy work, but every atom of matter, whether simple or compound, proves its wonderful adaptation for the use for which it was designed.

Sir R. Murchison expressed the interest that he felt in the theory which had been so well worked out by Dr. Rowan in the paper which had been just read. He would suggest the question, whether the freedom of the town of Birmingham from cholera arose in any degree from the use, in the manufacture of iron, of similar substances to that upon which Dr. Rowan had experimented? During the meeting of the British Association at Birmingham, that subject had been started, and it had been thought by various persons that the exemption of the town from cholera might be due to a chemical process going on in the sewers, in consequence of the mixture of sewage matter with the refuse of the iron manufacturers.

Dr. Rowan replied that the decomposition of sulphuretted hydrogen might take place in the sewers, as suggested by Sir Roderick's question.

Dr. Lingen remarked that the exemption of this county was the most remarkable, from the fact that the cholera had never begun within it. If it had begun, and had then stopped, it might have seemed that the cessation was connected with chemical action in the soil, as now suggested; but the difficulty was in the fact that the cholera had not begun.

Mr. Edmunds observed that, having lived for some years in Birmingham, he felt much interested in the allusion made to it by Sir R. Murchison. It appeared to him, however, that there were several local circumstances which might with advantage be taken into account, in seeking for the cause of Birmingham's immunity from the cholera. One of these was the great cleanliness of the town, compared with other towns, both large and small. Filth was generally held to be a predisposing cause of cholera. This statement was not inconsistent with the existence of another circumstance which he would name; the fact that the sewage of Birmingham was exceedingly defective at the time of each of the two great visitations of cholera. Within the last five years large sums had been expended in effecting a system of sewerage upon a scale not unworthy of comparison with the Cloaca Maxima of Rome; but before that time the sewerage was very defective. This evil, however, was less felt in Birmingham than it had been elsewhere, in consequence of the town being situated on a very absorbent stratum, the New Red Sandstone, and the surface being broken up into many sandhills.

Sir R. Murchison thought there was also another reason, besides the nature of the soil and subsoil, why Birmingham, as well as Herefordshire, and other districts and places, had escaped the cholera. Elevation above the sea is a circumstance which ought always to be taken in account, although it had been quite overlooked by the Press. All elevated places have escaped the cholera. There had not been a case in Switzerland; and in this country, although we have scarcely anything

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like elevation, yet the highest parts had also escaped. There had been no cases of cholera in the Highlands; along also what is called the backbone of England—at Buxton, for instance, where he was staying at the time of the last visit of cholera—there was not a case, while the towns lying right and left of the ridge were being desolated by that disease. He believed that no place more than 600 feet above the sea level had been attacked by cholera; and should it reach this country again, he should feel quite safe at any place above that limit. Many parts of Herefordshire are much more than 600 feet above the sea. It seemed to him, too, that the cholera generally followed the course of great rivers; now there were no great rivers near Birmingham.

In the course of the conversation which ensued, Dr. Gilliland and other gentlemen remarked that a great part of Herefordshire was watered by the Wye, but that its volume was too small to entitle it to be ranked as a "great river," while the county was cut off by chains of hills from the valley of the much larger river Severn. The exemption of the county from cholera might be due to the combination of the geographical and the chemical causes which had been named.

The healths of the President and of the new members having been drunk and suitably acknowledged, several papers were promised in future meetings. Among these we may mention a paper on Carpology, or the structure and arrangement of the fruit of plants, by Dr. Lingen, to whose kindness throughout the day, in imparting information, the botanical members were greatly indebted. From so profound a systematic botanist, on so important a branch of the science as that now selected, an interesting paper may be anticipated.

About 7 p.m. the party broke up, highly gratified and instructed by the proceedings of the day.

The next meeting was fixed to be held at Aymestrey, in the north-western part of the county, in September next, when it is hoped Mr. Strickland and others of the distinguished honorary members of the Club will be present.

The Hon. Secretary, Mr. Scobie, having since visited the Woolhope Valley with Mr. Otte, found the graptolites previously alluded to in abundance in a newly opened quarry on the southern slope of Backbury Hill, a few hundred yards to the east of Adam's rocks; the formation is a calcareo-argillaceous finely compacted deposit of Lower Ludlow shale, containing the exuviæ of trilobites, and the characteristic testacea of the period. They are of the species Graptolithus Ludensis, a zoophyte allied to Pinnatula, or Sea-pen. The existence of this fossil in the Silurian rocks of Woolhope is another interesting fact in the geology of Herefordshire, brought to light by means of the Woolhope Club.

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HEREFORD HORTICULTURAL SOCIETY.

CLOSING SHOW FOR THE SEASON (SEPT. 11, 1852).

The last Exhibition of plants, flowers, fruit, and vegetables, for the second season of this flourishing and useful Society, was held yesterday (Friday). At this late period of the summer, of course, the main portion of every such exhibition consists of dahlias and greenhouse plants. To the former, the weather of late has been by no means favourable; but before we enter into details on this point, we may with advantage call attention to a department of the Show, which was to a great degree independent of the weather. It will be remembered that in addition to the Society's prizes for collections of wild flowers—to which we have so often with pleasure called attention, as calculated to benefit society by extending our knowledge of the natural productions of this county, many of which are medicinally valuable, while it affords to the young a pleasant and instructive pursuit—prizes were also offered by Dr. Bull for the best collection of dried specimens of Herefordshire plants. These prizes could of course only be adjudged at the close of the season; and thus, one of the most pleasing and useful of the classes of objects for exhibition graced the final show. There were four Herbariums sent in for competition, but they were each very extensive, the plants numbering nearly 360 in the largest, and little short of 300 in the smallest. Considering that it was the first year of competition, this was a highly encouraging fact. It was also pleasant to find that the plants were, with very few exceptions, correctly named; while in all instances they were pressed and prepared with great care and neatness. One of these herbariums, bearing the motto "Garde l'honneur" (sent by Miss Riley, of Pencraig Court, to whom an extra prize was awarded), although botanically deficient in arrangement and nomenclature, was nevertheless deserving of very high praise for the exquisite taste with which it was executed. The flowers in the other herbariums were affixed to separate sheets of paper, in the usual mode, which is much more convenient than any other, since each plant is presented distinctly to the eye in all its parts, and its characteristics are more easily apprehended by the mind—the main object of such collections. In this instance, however, the tasteful predominated over the useful; the flowers were artistically grouped in wreaths, bouquets, letters, &c., upon large, square cardboards, in the sequence of the months, forming pictures well adapted for framing. The names of the plants, botanical and ordinary, with the locality in which they were gathered, were appended to the edges; while the specimens were all numbered, and the Linnæan classes and orders to which they belong, enumerated at the head of each card. The great defects of this collection, as we have hinted, were the crowding of the plants, which rendered it difficult even for botanical eyes to distinguish any one; and the fact that the specimens did not include the roots and stems, which are often the characteristic parts of plants. As the flowers in this Herbarium were arranged according to the months, a list may be useful to the young botanist.

(Here followed a list of the flowers for the months of April, May, June, July, August, and September, which it is unnecessary to reproduce here).

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The other Herbariums were got up with remarkable care and skill; two of them were, in fact, quite models of neatness, not a leaf being disarranged, while the hues of the flowers, usually so evanescent, were beautifully preserved. The plants were entire in all cases where that was practicable; and, where the size forbade it, portions of the root, stem, and foliage were presented with the flower.

Altogether, the collections sent in agreeably surprised the judges, to whom they were submitted, and on the whole are exceedingly creditable to the industry and care, and, in some instances, to the botanical knowledge of those who have formed them. The largest and most carefully arranged bore the motto, "Nature is the book of God, before thee set." (The Rev. James F. Crouch, Pembridge Rectory). It gained the first prize; the full size of the specimens, about 355—their careful pressing—generally correct naming—and scientific arrangement—being considered to bring it nearest to the standard desired. The collection forms an extremely interesting and valuable record of the plants of that part of our county.

The collection which gained the second prize, bore the motto "Tyro" (Mr. Thomas Blashill, jun., Mansell Gamage). It contained about 298 specimens, or rather sheets. This, in no degree, yields to the preceding one, in careful selection and drying of the specimens; but the sheets were of smaller size, and hence the specimens in many instances could not be so complete, and many of them were sent still green; this collection is, however, a model of neatness and care, and leaves little to be desired in style of pressing the specimens, while the errors of name were remarkably few. It is also a most interesting addition to our knowledge of our little explored county.

Next in value came the collection inscribed "Spero meliora"; very fair as to number and careful selection of specimens, and exceedingly creditable to one whose attention has only been so lately directed to the subject.

A very handsomely mounted collection bore the motto, "Collegisse juvat"; but though many of the specimens were of full size and carefully pressed, there was great irregularity in this respect, and the nomenclature was not what could have been desired. Many plants, too, were sent wholly unnamed.

The prizes awarded in this department consisted of a gold and silver pencil-case, manufactured by the celebrated London house of Mordan & Co., of very rich yet chaste design and workmanship. The extra prize given was an elegant small gold pencil-case, with ring to be attached to a chain.

The judge for the flowers of the divisions I. and II. was Mr. George Glenny, the celebrated florist; and the judge for the fruit and vegetables of the same divisions was Mr. Kidd, gardener to D. Peploe Peploe, Esq., of Garnstone.

The judges for the division III. were the Rev. J. Dudley, of Sarnesfield, and Mr. Thomas, of Belmont.

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The special prizes given by Dr. Bull, for the best Herbarium of Herefordshire wild flowers, collected and dried by the competitor within the year—1st prize, a gold pencil case, the collection marked with the motto, "Nature is the book of God before thee set," Rev. James F. Crouch, Pembridge Rectory; 2nd, a silver pencil case, the collection marked with the motto, "Tyro," Mr. Thomas Blashill, Mansell Gamage; an extra prize of a small gold pencil case was also awarded for the elegance and taste displayed in the arrangement of the plants, Miss Riley, Pencraig Court, near Ross.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, SEPTEMBER 21ST, 1852.

AYMESTREY.

The last meeting of the season of this useful society was held on Tuesday last, at Mortimer's Cross Inn, the object of the members being to explore the geology and botany of the neighbouring districts, which has given name to a very important formation of the Silurian system, the Aymestrey limestone. The morning, although wet and stormy at an early hour, gradually cleared up, and the day was very fine for the season, the high equinoctial S.W. winds having carried off the masses of rain-cloud which gathered so ominously in the morning. The members met at breakfast at 9 a.m., at the Mortimer's Cross Inn, those who had come from Hereford having greatly enjoyed the ride of fifteen miles through the charming scenery of that district. The chair was filled by Mr. R. M. Lingwood, the President of the Club, and there were also present the Rev. T. T. Lewis, Rev. J. F. Crouch, Dr. Bull, Dr. Rowan, Messrs. Ballard, Blashill, Cam, Otte, W. H. Purchas, Thompson, and the Hon. Secretary, Mr. Scobie, F.G.S.

Lord Gifford and the Rev. A. Kent, Minor Canon of Gloucester Cathedral, who had been proposed at last meeting, were elected members.

The Hon. Secretary read letters, regretting inability to attend, from the Ven. Archdeacon Lane Freer, J. Lee Warner, Esq., the Rev. W. S. Symonds, Dr. Davis, of Tenbury, and Sir R. I. Murchison. The letter of Sir Roderick, which was dated "Bangor, September 20th, 1852," contained the following passage :—

"I have only just got your letter, and much regret that I cannot be at Aymestrey, having been kept so long in Ireland. Offer my kind regards to all the Silurians, and assure them that my heart is with them."

The letter of Dr. Davis enclosed a list of ferns (with their habitats) found in the neighbourhood of Bockleton by Mr. George Miller, as follows:—Pteris aquilina, P. crispa, Polypodium vulgare, P. Dryopteris, P. Phegopteris, Asplenium Adiantum nigrum, A. Ruta muraria, A. Trichomanes, and A. viride; Aspidium aculeatum, A. dilatatum, A. Filix faemina, A. Filix mas, and A. lobatum; Scholopendrium vulgare, and S. Ceterach, Blechnum boreale; Osmunda Lunaria; and Ophioglossum vulgatum. The classification is that of Sowerby, except in the case of Asplenium viride, which is taken from Newman.

After the transaction of the routine business, the party started upon the pedestrian part of the excursion.

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The geologists, under the able guidance of the Rev. T. T. Lewis, who has for many years been known as a distinguished and successful investigator of the Silurian rocks, made their way first to the north-field quarry, an excellent example of the Downton sandstone. The characteristic lingula, with various superficial markings, indicative of early vegetation, were here noticed. From this spot they retraced their steps to Mortimer's Cross, and visited the Cross quarry, where the Upper Ludlow rock is worked. Thence they shaped their course to the quarries near Lucton, and afterwards entered the grounds of Croft Castle. In these grounds, some noble oak trees (Quercus sessiliflora) attracted all eyes, their great magnitude leaving the "Druidical" oaks at Bromfield, and other celebrated trees, far behind. The trunk of one was found to measure, including some excrescences, not less than 37 feet, and that of another 24½ feet in circumferance. Passing on to Croft quarry, the party there examined the Upper Ludlow rock. A beautiful wooded dell formed in the side of the lofty hill of Croft Ambury, excited much both of admiration and scientific interest. This dell seemed to have originated in a crack in the Upper Ludlow surface rock, which by the action of water was gradually denuded so as to bring to view the Aymestrey rock beneath, leaving precipitous cliffs, considerable in height This lovely ravine is interesting to the tourist on account of the extensive and striking landscape visible from its upper extremity, the view embracing a great part of middle and southern Herefordshire, with the noble old tower of Leominster Church in the middle distance. We described this view at length several years ago, when noticing the picnic of the Herefordshire Literary and Antiquarian Society on this spot, in their excursion to Wigmore, Croft Ambury, &c.

Crossing the ravine, the geologists traversed the Oaken Copse on their way to a quarry, which presents a prominent and beautiful example of the outcrop of the Aymestrey rock. The rock dips at an angle of 37 degrees, underneath the Upper Ludlow, and in the direction of the Old Red. From this spot they went along the ridge to the Camp of the British monarch, Ambrosius, whose name, in the corrupted form "Ambrey," it still bears. The view from this spot is one of unequalled grandeur and beauty, while to the geologist its prominent points are highly suggestive. To the northward, passing over the ancient lake of Wigmore, long since converted into fertile meadows, the eye reaches in the extreme distance Longmynd hill—said by some geologists to be formed of the oldest sedimentary rocks in the world; next, Stiperstones, a huge mass, once Caradoc Sandstone, but by the protrusion of igneous matter, converted into quartz; the broad summit of the Brown Clee, and the lofty peak of Titterstone, capped with columnar basalt; while in the far east are visible the New Red Sandstone Hills of Worcestershire, and in the south-east, the Syenitic Malverns, and the long line of Oolite called the Cotteswolds. To the south, the eye ranges over the broad vales of Herefordshire, broken by hills of Old Red, and passes off to the Carboniferous district of South Wales. Westward a sea of hills presents itself, vast billows of Old Red Sandstone, among which the dimly seen Breconshire Vans (ban or van, high), the wall-like Hatteral and its continuations northward, Radnor Forest, the Wimble, and other innumerable summits meet the eye. After spending some time in

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admiring this vast panorama, the party descended the hill, passing over the Aymestrey rock to the Lower Ludlow.

At Aymestrey they visited a quarry, in the beautifully laid out grounds of Mr. Lewis, which was interesting, as presenting a fine escarpment of rock, perhaps 100 feet high, quite even and wall like. The rock is so jointed that, as it is worked it preserves this evenness of vertical surface. From the quarry Mr. Lewis conducted the members into his residence, where he threw open for their inspection a collection of fossils, the fruits of many years careful investigation of Silurian and other rocks, and certainly one of the finest collections in the kingdom. The botanists of the party had a very delightful ramble, although nothing was met with which had not been previously detected in the county, with the exception of Lycopodium clavatum, of which one of the members met with a very small portion. Polypodium Dryopteris, and also Scrophularia Ehrhardti, was scattered in its previously known station of Aymestrey, and notwithstanding the late season of the year 300 species or more were ascertained to be natives of the district visited, though many plants which may have been expected to occur, proved absent.

Several beautiful fungi (Clavariæ and Agarics) were seen in the woods of Croft Castle.

The company then returned to Mortimer's Cross Inn, where they carried out the spirit of the poetic resolution,—

"I am resolved:
The mind shall banquet, though the body starve,"

in a manner much more satisfactory than a literal fulfilment could possibly have been. The mind having "banqueted," the body was treated with equal justice. After partaking of an excellent dinner, on the cloth being removed, the Chairman gave the usual loyal toasts. He then proposed, in complimentary terms, the health of the Rev. T. T. Lewis, thanking him, not only for his kindness in acting as their guide to so many interesting and instructive spots in the day, but also for the bountiful supply of fruit which he had sent for the dessert (applause).

The Rev. Mr. Lewis returned thanks, in a neat and suitable manner, for the compliment paid to him. He remarked that, although they had had a long ramble that day, they had only done half their work. They ought to complete it by visiting the other side of the anticlinal. He would suggest that next year they should hold one of their meetings at Leintwardine in the morning; that they should start from that place after breakfast, and after examining the Wenlock formation, make their way down to the northern limit of to-day's excursion; and meet in the evening at Mortimer's Cross to dinner, as on the present occasion (applause). He went on to remark upon the importance of meteorological observations. He considered such to be quite within the objects of the Club, and was glad to observe that a Meteorological Table was published weekly in the *Hereford Times*. He was sure that if any member would undertake to record observations, the Meteorological Society of London would furnish the necessary instruments.

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Mr. Scobie said the tables in the *Hereford Times* were furnished by Dr. Rowan, one of the members present, who he believed acted upon the principle carried out for many years by the late Captain Pendergrass, whose averages for the last thirty years, and instruments, had been handed over some time ago to Dr. Rowan.

Dr. Rowan said that, although he possessed duplicates of Capt. Pendergrass' recorded observations, and continued to register according to the regulations of the Greenwich Observatory, he did not possess Capt. Pendergrass' instruments, although those he used had been approved of by the Captain.

REPORT OF THE WHITCHURCH FIELD MEETING, HELD 20TH JULY, 1852.

In describing the geological phenomena which came under observation at our First Field Meeting, I took occasion to remark that, in proceeding from the base of the Old Red Sandstone to the Silurian formations of the Woolhope valley of elevation, we receded from a period of vertebrate to one of invertebrate marine life. At that early epoch of the world's physical history, "mighty ocean" seems to have held almost undisputed dominion. Traces of dry land are but dimly perceptible; and the Terrestrial Flora, which to-day gladdens the face of nature, lay undeveloped in the womb of time. Our researches at Whitchurch, on the other hand, led us progressively forward from the upper strata of the Old Red Sandstone to a formation crowded with evidence of vegetation infinitely more profuse and luxuriant than can be found to have existed during the human epoch. The weather was highly favourable, and the attendance of members good. We were, moreover, gratified by the presence of three honorary members, Sir Roderick Murchison, H. E. Strickland, Esq., and the Rev. Peter S. Brodie, gentlemen of the highest distinction in the scientific world, to whom we are indebted for much valuable geological information most courteously communicated during the course of the day.

Before entering upon the details of our visit to the Coal Measures of the Forest of Dean, it may not be out of place to offer a few remarks upon the sandstones, marls, clays, and cornstones, or impure limestones, intervening between the Silurian and Carboniferous formations, geologically known as the Old Red, or Devonian system. In the clays and marls of the series, organic remains are extremely scarce; and it is therefore a matter of difficulty, except by observing the order of super-position, to determine their relative ages.

This difficulty is greatly increased by the dislocations and local upheavals to which the area of our county has been subjected; but, in the sandstones and cornstones of some localities, remains of fishes of the placoid and ganoid orders are readily discovered, and have enabled geologists to divide the system into three groups, in conformity with a similar arrangement adopted in Scotland and other parts of the world. Each group is characterised by peculiar organisms: of these, without entering into minute detail, the Dipterus distinguished the Lower,

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or tilestone formation, and was first brought to light by Sir R. Murchison. This was a ganoid fish of a type to which we find no living analogue; internally cartilaginous, it was defended externally by finely enamelled osseous plates and scales, the skull and jaws being as naked and polished as its teeth.

The Middle, or Cornstone, formation is characterised by the Cephalaspis, also a cartilaginous fish, covered externally with strong plates of bone, having an enormous crescent-shaped cephalic shield with a comparatively small body, jointed so like the lobster that, when first discovered, it was supposed to be a Crustacean; its remains are found in the neighbourhood of Hereford associated with the spines or rays of the dorsal fins of the Onchus, a placoid allied to the shark.

The Holoptychius, a sauroid, or reptile fish, marks the Conglomerate or Upper Division of the system. This creature must have been of great magnitude, for its thick enamelled scales are as large as oyster shells, and its teeth rival those of the crocodile.

Although fossils are the safest guides to the identification of the sedimentary rocks, still the geologist does not always find that synchronous formations yield similar organisms. There is a striking dissimilarity in this respect between the Old Red formations of Scotland and Devonshire. In the former, shells are entirely absent, and the remains of fishes abundant; while, in Devonshire, the converse is the case.

It would, therefore, have been impossible confidently to refer strata so oppositely characterised to the same system, had not Sir Roderick Murchison, and M. de Verneuil, in their memorable researches in Russia, found there fishes similar to those of Scotland and Herefordshire associated with the mollusca and corals of Devonshire, proving incontestibly their co-existence, and that they constituted together the fauna of one great Devonian ocean. Thus was confirmed the accuracy of the classification previously adopted at the suggestion of Mr. Lonsdale, founded on the assumption that the Devonshire fossils presented a character intermediate between those of the Carboniferous and Silurian systems.

Fishes of extinct genera were, until lately, the highest types of the animal kingdom met with in the Devonian strata; but Dr. Mantell, in the quarterly journal of the Geological Society, has described a fossil reptile discovered last year in the Old Red sandstone of Morayshire, which he has named the Telerpeton Elginensis; and also some fossil ova, supposed to be batrachian. These, with a few footprints and scattered traces of vegetation, resolved, in some instances, into coal, appear to be the only indications of terrestrial life hitherto met with in this system.

At length, the era of the Old Red Sandstone passed away, and upon its uppermost formation, the Conglomerate, were deposited the richly fossiliferous strata of the Carboniferous Limestone, a purely marine deposit, averaging some hundred feet in thickness, and containing the remains of fishes, shells, encrinites, and corals. Overlying the limestone, we find a coarse quartzose sandstone passing

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into a conglomerate styled, from its economic usefulness, Millstone-Grit, in which, with marine organic remains, drifted land plants are common, and on which repose the Coal Measures.

Starting from Whitchurch, which, as I have said, is situate upon the superior Old Red Sandstone system, our party proceeded to the escarpments of the Carboniferous or Mountain Limestone quarried on the cliffs of Doward Hill. Here some time was agreeably spent in the collection of fossils; after which, we crossed the Wye to the luxuriantly wooded range known as the Coldwell rocks, and from thence ascended to the far-famed Symonds Yat.

The extensive view from this lofty promontory is so well known, as to require only a passing allusion; but geologically, as described by Sir Roderick Murchison, it excited more than common interest. Standing on the limestone ridge, which forms the edge of the coal basin of the Forest of Dean, the author of the Silurian system pointed out the various formations as seen from that commanding elevation. To the north the eye ranged over a wide extent of Old Red Sandstone, bounded in the distance by the Syenitic peaks and Silurian upcasts of the Malverns —to the south stretched the Millstone-Grit and Coal Fields of the Forest of Dean, embracing the entire series of Palaeozoic Strata which lie within the province of the Woolhope Club.

Gazing over the widely diversified scene, our attention was naturally directed to the consideration of the physical changes the country had undergone, more especially to those produced by denudation. Mr. Strickland's observations on the subject were highly instructive; he remarked that every drop of rain has, in seeking its level, a degrading influence, and carries with it, however minute the quantity, a supply of materials towards some new formation. The sea undermines and encroaches upon our coasts—rivers furrow out their channels, carrying with them, and depositing elsewhere, the sediment with which they are charged—such hydraulic forces are not confined to the present time, but have been in operation from the remotest ages, and we have but to make allowance for long periods of submergence to account for the disappearance of the vast masses of strata which have been swept away from the area before us.

In a practical address delivered by the Rev. W. S. Symonds, he particularly urged the necessity of cultivating habits of observation even in small matters, for in the economy of nature nothing is unimportant, and it not unfrequently happens that objects of apparent insignificance prove valuable aids in determining scientific facts. The rev. gentleman's remarks were exemplified by observations made during the course of the day.

In one instance, a vertical fissure in the Old Red Conglomerate on the slope of the promontory of Symond's Yat was observed to contain a stalagmite formed by the percolation of water charged with carbonate of lime.

The remarkable occurrence of a calcareous stalagmite in a fissure of siliceous conglomerate was explained by Mr. Strickland as being due to the carboniferous limestone, which had once extended over the conglomerate, but had since been removed by denudation. The constituents of this conglomerate also bear

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testimony to the value of Mr. Symonds' remarks. It is made up of water-worn pebbles, vein quartz, jasper, &c., which were embedded in the sediment of a turbid ocean, and it is a subject for enquiry whence those rounded pebbles were derived. Like the stalagmite just spoken of, the siliceous veins, of which the pebbles are the remaining fragments, were evidently formed in fissures and crevices of sedimentary rocks, but of a still more ancient system, which had been broken up ere its constituents were washed into the Devonian seas. Many of the pebbles were observed to have portions of the ancient rock still adhering to them.

Under the guidance of Mr. Strickland, a number of the party proceeded southwards from Symond's Yat to the coal-pits at Christchurch. On their way thither he pointed out the outcrop of Millstone-Grit which forms the inner edge of the Coal basin. The structure and organisms of this formation lead to the conclusion that it was deposited in a shallowing sea in the vicinity of land, and that it subsequently received a deposit of muddy sediment destined to become the soil, whence should spring up a vegetation far surpassing in luxuriance that of the most favoured tropical spots of the present day. Geologists are, however, not agreed as to the precise circumstances under which the vast accumulation of vegetable matter took place to produce the phenomena of the Coal Measures. The most prevalent opinion cannot be better explained than in the words of Sir Charles Lyell :—

"The beds throughout, with the exception of the coal itself, appear to have been formed in water of moderate depth, during a slow, but perhaps intermittent depression of the ground, in a region to which rivers were bringing a never-failing supply of muddy sediment and sand. The same area was sometimes covered with vast forests, such as are seen in the deltas of great rivers in warm climates, which are liable to be submerged beneath fresh or salt water should the ground sink vertically a few feet."

This pulsation of the earth's crust, if I may be allowed the expression, appears to have been in periodical operation, and continued at intervals during the deposition of the Coal Measures. We accordingly find an alternation of many seams of coal, sandstone, and shale, attaining in South Wales the extraordinary thickness of 12,000 feet. In this field, which appears to be entirely of fresh water origin, the number of coal seams is about 100, each accompanied by its under clay. That the Coal fields are the remains of a vegetation which, after flourishing on the spot, passed into the condition of a peat-moss, and then became submerged, is rendered probable by the fact that the underclays contain the roots of stigmaria occupying the original spots on which they grew. Stems of trees, still retaining their upright position, are familiar to all miners, under the name of "coal pipes."

"These coal pipes," again to quote Sir Charles Lyell, "are much dreaded by miners, for almost every year in the Bristol, Newcastle, and other Coal fields, they are the cause of fatal accidents. Each cylindrical cast of a tree, formed of solid sandstone, and increasing gradually in size towards the base, and being without branches, has its whole weight thrown downwards, and receives no support from the coating of friable coal, which has replaced the bark. As soon, therefore, as

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the cohesion of this internal layer is overcome, the heavy column falls suddenly in a perpendicular or oblique direction from the roof of the gallery whence coal has been extracted, wounding or killing the workmen who stand below. It is strange to reflect how many thousands of these trees fell originally in their native forests, in obedience to the laws of gravity; and how the few which continued to stand erect, obeying after myriads of ages, the same force, are cast down to immolate their human victims."

With respect to the fauna of the period, no air-breathing creatures, with the exception of a few insects, had been discovered until the year 1844. Bones and footprints of reptiles have, however, since that time been met with in several parts of the world. Beds of fresh water shells alternate with marine strata, containing fishes associated with crustaceans and molluscs; but the most remarkable feature of the period is its flora, composed chiefly of cryptogamic plants of gigantic size, differing specifically from living types; and it is further remarkable that in the most widely separated parts of the world, where coal has been discovered, such as Australia and America, a striking uniformity of genera is found to have prevailed. Cycadeæ and Coniferæ, but no true exogens, and only a few endogenous plants, referred to palms, have yet been met with; huge stems and leaves of ferns, equisetums, or horse-tails, and lycopodiums or club-mosses, are, however, found in great profusion, rivalling in point of size the forest trees of modern times. Specimens of these, such as sigillaria, calamites, lepidodendra, &c., were collected from the Coal shales at Christchurch by our party. A comparison of the flora of the Coal measures with plants of living species, establishes the remarkable fact in natural history that, as we find in the animal, so it is in the vegetable kingdom, many intermediate links in the organic series have been lost.

It is believed by geologists, and supported by the evidence of botanists and chemists, that this superabundant vegetation was nurtured by a warm and moist atmosphere, charged with an excess of carbonic acid gas. Such a condition of things would have been highly favourable to vegetable, though not to animal life, accounting satisfactorily for the paucity of air-breathing animals already alluded to as being characteristic of the period. Through the absorption of carbon thus going forward in the vegetable kingdom, the atmosphere was undergoing a chemical process of preparation by which the earth became a fit habitation for that superior class of animals which were afterwards to appear.

If we regard this vast depository of carbon, with its associated iron-stones, in relation to the social and intellectual advancement of the human race, we cannot fail to recognise the wisdom and goodness of the Creator, and the perfect design everywhere evinced in all His wondrous works.

Having remained for some time at the Coal pits, our party retraced their steps to Whitchurch, devoting the time to botanical observations, and receiving from Dr. Lingen much valuable information as to the structure and properties of the plants collected. On our re-assembling at the inn, a choice selection of Silurian fossils, chiefly trilobites, in excellent preservation, was exhibited by Mr. Richard Johnson, of Hereford. Some fragments of deer's horns, and the bone of an ox,

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found at the depth of 20 feet, in the silt deposit which forms the southern bank of the Wye, at Hereford, in digging a foundation for the Railway Bridge now in progress, were also laid upon the table. Petrifaction not having taken place, and their polished surfaces indicating that they still contain a considerable amount of gelatine, these mammalian relics must be of comparatively recent date, probably of the human epoch.

Mr. Otte exhibited specimens of graptolites from a newly opened quarry at Backbury Hill, in the Woolhope district, where the exuviæ of that zoophyte had never been previously observed. Having since visited the spot, I found them as described by Mr. Otte in great abundance. They are of the species Graptolithus ludensis, and are embedded in a finely compacted calcareo-argillaceous deposit of Lower Ludlow shale, containing the remains of trilobites and the characteristic testacea of the period.

The day having thus been most agreeably spent, our Whitchurch Meeting broke up at 7 o'clock p.m., the Members expressing a hope to meet and enjoy an equally pleasant ramble over the geologically-famed rocks of Aymestrey.

Postscript.—My attention has just been directed to a paper read by Professor E. Forbes at the recent meeting of the British Association at Belfast, upon some remarkable fossils quite new to geologists, discovered lately near Kilkenny, in yellow sandstone of the Devonian epoch. They consist of the remains of ferns, lepidodendra, &c., accompanied by fish, remains of Old Red types, and traces of crustacea. As no fossil plants of the kind had ever previously been detected in British strata of such high antiquity, I allude to this interesting fact. They indicate the proximity of land, and were probably embedded under estuary conditions.

In this county I have frequently found small spherical organisms, or carbonaceous pellicles, which, under the microscope, reveal structure of a peculiar kind, and which, without venturing too confident an opinion, I think will prove upon closer inspection, to be seeds or pericarps of land plants.

In company with Mr. Strickland, I lately found them abundant in Cornstones used for repairing the roads near Monmouth Cap, associated with other carbonaceous markings, and with the remains of the Cephalaspis. We are informed that these Cornstones were quarried near Llanfihangel.

I have also met with similar pellicles in the Silurian rocks where sea-weeds, especially fucoids (which constitute the earliest forms of vegetation on our planet) have alone hitherto been found to represent the vegetable kingdom.

The specimens on the table are from the Ludlow fish-bed of Hagley Park quarry, where the ripple marks seem to indicate a beach. The fish-bed is mixed up with a thin layer of vegetable matter, converted into coal. I have observed pellicles of the same age at Prior's Frome, and I learn from Mr. Strickland that he has discovered them in the very same stratum at Gamage Ford.

In the hope that, by following up these researches in other parts of the country, additional light may be thrown on the subject through the collection of

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further evidence as to the yet questionable existence of a terrestrial flora in the Silurian ages, I bring these facts before the notice of the Club.

The report was much applauded, and the health of the Hon. Secretary was then drunk, with thanks for his excellent report, and suitably acknowledged.

Mr. Purchas proceeded to read an instructive essay on the geography of plants. This was followed by an interesting paper by Dr. Rowan. Thanks were unanimously voted to Mr. Purchas for his valuable paper. Dr. Bull handed in for the use of the members a carefully compiled list of plants found in this county, arranged on the natural system, and named according to the London Catalogue, as far as specimens of them were included in the Herbariums sent in for competition at the last show of the Hereford Horticultural Society. This list is calculated to be of great use to the young botanist; and it might be with advantage printed by the Club in a separate form.

Thanks having been unanimously voted to the President for his conduct in the chair, the party broke up between 7 and 8 p.m.

October 2nd, 1852.

Remarks.

In our report of the Aymestrey Field Meeting last week, we omitted to mention the vote of thanks passed to the High Sheriff of the County, W. T. Kevill Davies, Esq., of Croft Castle, for his polite attention in throwing his grounds open to the Club.

It is a matter for gratulation that the several proprietors in whose localities the Club has held its meetings during the season, have, with an enlightened spirit, highly encouraging to the votaries of science, offered every facility to the Members for the prosecution of their pursuits.

With a willing readiness, proving his appreciation of the study of Nature, and at a considerable expense and inconvenience, Mr. Robert Biddulph Phillips, of Longworth, lately caused a quarry, which had been partially filled up, to be re-opened for a party of geologists, Members of the Club, who were anxious to investigate a remarkable protrusion in Silurian rocks, discovered on his estate at Hagley Park.

BOTANICAL GEOGRAPHY.

By W. H. Purchas.

The science of Botanical Geography is one of comparatively recent origin. The great and striking changes in the aspect of vegetation as we ascend from the plains to the summits of lofty mountains, as we pass from the equator to the poles, or from one continent to another, had long attracted the wondering notice of travellers and botanists; but it was reserved for men still living—foremost amongst whom stands the illustrious Humboldt—to arrange facts and develop the laws of the phenomena which constitute the basis of this philosophical department of botany.

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If we consider the existing distribution of plants upon the earth's surface, we find that two classes of phenomena present themselves to our notice; one which evinces a close dependence upon the distribution of heat and other elements of climate, and is simply the result of the peculiarities of constitution in the various species, which, as they cease to meet with their climatal requirements, become earlier or later arrested in their progress towards the equator or the poles; the other, clearly independent of physical causes, and remaining as a residuum of unexplained facts after the influence of heat, moisture, and other elements of climate, have been fully taken into account, and for the explanation of which we must look beyond any causes at present in operation; for example, when we examine the lists of plants which grow spontaneously in different countries, we find that, though these countries may be closely alike in physical condition, the species, and even natural families which inhabit them, are more different in proportion as these countries are widely removed from each other. Thus the vegetation of Europe has a tolerably uniform character; but, if we pass over to America, we find that a very small proportion of British plants grow wild there; and, if we extend our glance to Australia, we meet with but one or two European species, the flora being wholly unlike that of the northern hemisphere, and made up in great part of natural families which have no European representatives (Goodeniads, Epacrids, Stylidaceæ). That the absence of the requisite physical conditions is not the cause of this, we have abundant proof in the fact that so many of our British plants have readily established themselves when once introduced to America; and conversely, that American species have been thoroughly naturalised in Britain and other parts of Europe. To explain these facts then, no other course is open but hypothesis; but no hypothesis can be fully received until we have made certain that the facts on which it is based are not the results of physical causes, unless also it is found to explain all the facts when thus sifted.

These striking differences in the floras (as they are termed) of distant regions may, it has been found, be expressed on maps by marking down the regions of the world in which the various families have their greatest development. Thus in the tropics we have the region of palms and bananas, &c.; and in temperate latitudes, the region of oaks and European dicotyledonous trees, with others, which I must not stay to mention. Now the hypothesis which the study of these phenomena has induced botanical geographers most generally to adopt is that which supposes species or groups of species to have been created at different centres, from which, by their gradual spreading, they have, like so many intersecting circles, populated the intervening regions, and produced the complex character of their existing floras.

If we turn our attention to the vegetation of Great Britain, and compare it with that of surrounding countries, we find that the great mass of species distributed through the lowlands are identical with those of what is termed the north German or Central European Flora; that in the south western extremity of England there is an addition of species more peculiar to France; while in the S.W. of Ireland, together with these, occur several which, on the continent of Europe,

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are seldom met with north of the Pyrenees; and further, that the mountains (and in the north of Scotland the comparatively low tracts near them) are characterised by the presence of species which seem to have their metropolis in the Scandinavian peninsula, and on the higher summits of southern Europe. Thus there is but one British species not present on the Continent.

Beyond this brief general notice, it is not my intention to speak of the external relations of British plants. I wish rather to draw your attention to the peculiarities of their natural relations within the limits of our islands; to show the light in which the Herefordshire Flora—at least what we know of it—appears, when viewed in connection with the whole British Flora; and to point out to those who may be willing to help in its complete elucidation the various kinds of information required, and the directions in which their energies may be most profitably directed.

The species composing the indigenous flora of Great Britain may be studied —first, as to their areas of distribution; secondly, as they occur in ascending or climatic zones. With regard to the first mode of grouping them, Mr. Watson, who has so long and laboriously studied the geographical relations of British plants, distinguishes what he terms seven types of distribution, according as the species evince a predilection for one or other part of the island. These are:—

1. The British type, consisting of generally distributed species, evincing no peculiar predilection for one part of Great Britain more than another. Some few, as Viola palustris, extending from the sea-level on the south coast to near the summits of the highest Scotch mountains; others having a more restricted range. This includes about two-fifths of the whole number of British plants.

2. The English type, comprising plants which have their chief prevalence in England, particularly in the more southern provinces, whence they gradually become rare in a northward direction. About one-fifth of the whole British flora ranges here.

3. The Scottish type—the opposite of the English; the plants referred to here having a northward tendency, and becoming rare toward the south. This includes perhaps one-twentieth of the whole number of species.

4. The Highland type. It consists of plants limited to the higher mountains and their immediate vicinity. About one-fifteenth of the entire number of British species come here.

5. The Germanic type, so called from the species being most abundant in those provinces which are washed by the German Ocean, and shading off to the western side of the Island.

6. The Atlantic type; plants of the West of England, some of which are absolutely restricted to Cornwall; the others occurring very rarely, if at all, towards the east coast.

7. A local or doubtful type; species whose distribution is restricted to single or few counties, occurring too rarely to be ranged with the British type,

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and yet in too scattered and irregular a manner to agree with either of the other types.

It must not be supposed that the plants thus grouped have exactly identical limits; different species show the features of the type to which they belong in different degrees of intensity; while it is obvious that these general tendencies towards one side or other of the kingdom will be interfered with by the varying character of soil and situation; uniform distribution within the known limits of their areas being prevented by some species growing only in water, bogs, or marshes, or requiring for their free growth and multiplication a calcareous, sandy, or other special kind of soil.

With regard to the second mode of grouping plants, according to their latitudinal or climatical range, it is obvious that the same change of climate which we meet with in ascending elevated summits in more southern parts will, if we proceed farther north, be found repeated at a lower and still lower altitude, till, at a certain point, it will reach the sea level; and if we connect all the points from the summits of the hill on the one hand, to the coast line on the other, which are characterised by the same climate, we obtain a series of zones, each of which presents marked differences of vegetation. Mr. Watson considers that six is the greatest number of such zones which can be satisfactorily distinguished, if regard is had to the whole of Britain; and these six range themselves into two principal groups, which he terms "regions."

In uncultivated countries, such regions and zones can be readily noted by the means of the various trees, to whose growth opposing climate sets a limit. In England such a method would be impracticable. The very obvious mark of the limit to which cultivation can be carried is therefore adopted to distinguish the boundary between these two regions; and where, from other interfering causes, culture is absent, nature supplies us with a second test in the common Brake fern (Pteris aquilina), rarely absent from such spots, and whose limit coincides very nearly with that of cultivation. The upper zones, separated by this line of culture from the three lower ones, constitute the arctic region. Now, as it is evident that no part of our county lies within this upper—the arctic region—I will not dwell upon the peculiarities of its several zones, but pass at once to the distinguishing marks of those of the lower, or agrarian region.

The diagram will show that the three zones of the arctic region are confined to the mountains, the latitude of the north of Scotland not being high enough to allow it to reach the coast level. The highest part of the agrarian region, commencing on the coast line of the north of Scotland, and including, as we come southward, portions of the higher hills of England and Wales, is called the "super agrarian zone"; and, as we descend from the arctic region, is marked by the first appearance of the oak, the ash, hawthorn, and holly.

Immediately below this lies the "mid agrarian zone"; composing the coast line and low grounds from the estuaries of the Clyde and Tay down to those of the Dee and Humber, and a narrow belt winding round the hills of Wales. This zone is chiefly characterised by the upper limit of the common maple, the dwarf

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furze (Ulex nanus) and the black bryony (Tamus communis), &c., falling within it. Here, I think, it is we first approach the position of our county. The Hatteral hills, on its western border, certainly lie within this zone (if they do not attain to the one above it); and possibly a narrow tract along their base may also be included, as the proximity to a hilly district always influences the climate and vegetation of comparatively low tracts. The globe flower (Trollius Europæus) illustrates this; it is a plant which never, I believe, comes below this zone; it occurs in some plenty about Cusop hill; but it also descends to low ground about Monnington (as Dr. Bull informs me); while it is absent from the east of the county. I am not sufficiently familiar with the Malvern range—the eastern boundary of Herefordshire—to be able to say whether they fall within this zone or not. But at equal altitudes it is possible that their climate would be higher than that of the Black Mountains, on account of their isolated position. In this place it is well to remark that the short distance to which cultivation can be carried up these hills is due, not to the deterioration of climate, but to more special causes, such as the scantiness and infertility of the soil, and the conformation of ground, &c.

The lowest, called the "infra-agrarian zone," embraces all the country south of the Dee and Humber, excepting the mountainous tracts of Wales and the higher hills and moors of the south and south-west of England. The plants mentioned as commencing in the mid-agrarian zone become more frequent in this; and one or two are absolutely confined within its limits; Clematis Vitalba, the common Traveller's Joy, is one of these. It is in this zone that the greater part of Herefordshire lies; and the Clematis occurs frequently in the hedges and woods of the southern part. The vegetation generally may also be considered very characteristic of this zone.

Let us now see what kind of flora we might expect to meet with in Herefordshire, when all its peculiarities are taken into account. Situated in the south-western portion of the kingdom, our county seems most likely to produce chiefly plants of the British English and Atlantic, together with a small intermixture of the less strict examples of the Scottish and German types of distribution; further, as it constitutes an undulating tract sloping from the hilly district of South Wales towards the vale of the Severn, from which it is separated by the Malvern and Abberley ranges—rarely, moreover, rising into eminences of considerable altitude, and exhibiting an almost unbroken series of rich pastures, arable lands, and dry woods, the most abundant species from the above-mentioned types will naturally be those least restricted to heathy and upland tracts, and which evince the greatest readiness to adapt themselves to the alterations produced in soils by culture. On the other hand, the rarities of our county will consist of rock, heath, bog, and mountain plants. Water plants are not likely to be found, because only a few species find a congenial home in the waters of the Wye, on account of the rapidity of its shallower parts—its uncertain height, and violent floodings. These anticipations will, I think, be borne out when Herefordshire botany shall have received the attention which the interests of science render desirable. My remarks on the physical character of the county relate chiefly to its southern half,

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as that with which I am almost exclusively familiar. With the plants of this portion I am likewise best acquainted; and through the assistance of various botanical friends, my list of them now amounts to nearly 700.

The whole number of species which I know on good authority to grow within the county limits is under 700 (693). And the natural orders most fully represented by species are Compositæ, Gramineæ, Cyperaceæ, Rosaceæ, Leguminosæ, Lamiaceæ, Scrophulariaceæ, Cruciferæ, Umbelliferæ, Caryophyllaceæ, and Ranunculaceæ, mentioned in the order of their numbers.

The whole flora of Britain, excluding all Cryptogamous plants, except the ferns and their allies, amounts to 1,400 or 1,500. It is impossible to name an exact number, because of the conflicting opinions on the limits of species; and the number of these growing in single counties usually amounts to from 700 to 900. Shropshire produces 876, or more; Surrey about 800; and Hertfordshire 900, or nearly. Hence, making all allowances for unlike conditions of soil and situation, it is impossible not to believe that many Herefordshire species remain undetected; and now that good botanists seem to rise up in unexpected quarters of the county, we hope that these lurkers will shortly be drawn from their concealment. To those who may be willing to help in working out a local Flora, I shall be glad, by private correspondence, to communicate matters of detail, which it would be tedious to dwell on after taking up so much of your time. Permit me, however, to mention some of the general heads of inquiry.

First, lists of species. The exact mode of inquiry at which we should aim requires not merely a general list for the county, but for smaller tracts of country. Such districts should include about 50 square miles. I am engaged in dividing Herefordshire into such a series as seems most suitable; and I shall be exceedingly glad of help in those which lie in the northern half of the county.

Besides an exact catalogue of every plant occurring in each of these districts, with special localities for the rarer ones, it will be of great value to note carefully the times of flowering—commencement, greatest perfection, and duration—in the various species; also any reasons for concluding plants to have been introduced by the agency of man. And, in connection with this point, it is often of great service to learn the date at which woods were planted. The character of the timber, for example, the relative frequency of the two or three kinds of British oak, and their economical value, would also form an interesting subject of enquiry.

Secondly, a correct series of meteorological observations taken in different parts of the county, particularly towards the N.E. and S.W. points. But, to render these comparable amongst themselves and with others, it is needful that they should be taken with properly adjusted instruments, and according to the form recommended by the Meteorological Society.

Thirdly, the relation of species to the various soils. In this direction it is that the investigations of small tracts of country—whether counties or smaller divisions—is most likely to subserve the interests of geographical botany. The question is as yet ill understood, and, moreover, much too wide to enter on here.

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I will, however, just say that there are two principal opinions upon it; one which maintains the choice of one soil rather than another by a plant to be due to its chemical constitution; the other tracing the choice to its mechanical and hygrometrical qualities. Though of so great importance to be known, the chemical qualities of soils fall without the range of ordinary observation. We must wait for their investigation till possessed of some competent help. But I think that any pains-taking observing botanist may do much towards tracing the influence of their mechanical and hygrometrical properties upon plants. I would, therefore, suggest that a commencement should be made by noting the various kinds of soil in a district, not resting in the old division into sands, clays, and loams, but first dividing them according to the degree of disintegration of the rock whose detritus mainly constitutes them. This may be partial, as in the case of sands and gravels, or complete, as in clays, loams, &c. They should then be studied with regard to their hygrometric properties—as to their relative degree of retention, transmission, and evaporation of moisture. And when their peculiarities have thus been noted, the relative abundance of species not common to all soils must be carefully observed, selecting for this purpose plants which are tolerably conspicuous, and at the same time, such as are likely to be present, if the soil is suitable. Or a shorter process may, if this is too complex, produce very valuable results. Such might consist in observing what species are not present on all soils, and then ascertaining what qualities are possessed in common by those soils which do produce them.

Fourthly, Altitudinal range of species. On account of the physical character of our county, this is not a fertile branch of enquiry; yet it is desirable to note "the highest and lowest places at which species occur, whether in absolute height, in comparison with the appearance or cessation of other species, or in relation to the parts of particular mountains, as at the base, middle, or summit." And lastly, "any other information of an historical, economical, and philosophical nature tending to illustrate the Flora of Herefordshire, or the science of botany, cannot fail to be of much value."

THE DESTRUCTION OF FERN AND GORSE BY THE APPLICATION OF FRESH LIME, &c.

By Dr. A. Rowan.

At the Aymestrey Meeting of the Woolhope Club, Dr. Rowan, of Hereford, read the interesting paper on this subject, which we subjoin:—

Being a few months back at an agricultural meeting in the adjoining county of Radnor, I was interrogated as to the cause of various phenomena occurring in that locality. Facts were brought forward of which I had no previous knowledge, and which required investigation before a correct reply could be given. One question asked was, why does the application of lime to fresh broken up land destroy fern and gorse, it being ascertained that the application of guano produces an opposite result? I requested that specimens of those plants should be furnished to me, together with a portion of the soil, as well as of the lime used in

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the district, expecting that by investigating those specimens, I might be able to put the question to nature in a proper manner, and receive a correct reply. In this I was not disappointed.

Having weighed a given portion of the gorse, and fern, I burned off the organized elements, and having weighed the residue of each, I found that the fern left of ashes per 100 parts, 8·6, and the gorse 5·0. The fern contained 7 per cent. of silica, the remainder being carbonate of lime and magnesia, with traces of peroxide of iron and alkaline chlorides. The gorse contained 5 per cent. of ashes, and was composed of peroxide of iron, carbonate of lime, and magnesia, a little silica, and a trace of the alkaline chlorides; the iron was in greater abundance than in any other plant I have examined, though I believe it was not necessary to the healthy development of this plant. The analysis of the soil showed that it contained besides a great deal of soluble silica, an unusual proportion of organic acids, such as humic acid, arising from the decay of a large proportion of vegetable matter in the soil.

The analysis of the lime showed that it was similar to lime generally found in this district. I had here a plain and satisfactory solution of the problem; first it was evident that silica was the chief inorganic food of the fern, and it abounded in the soil, and from the quantity of carbon compared with the inorganic elements in the gorse, it was clear that besides the portion of carbon supplied by the atmosphere, this plant must take a large proportion from the soil, and the soil was rich in carbon, in a state of transition into carbonic acid. Now if the lime possessed the property of precipitating in an insoluble state the indispensable food of these plants, the cause of their destruction was at once plain. By direct experiment I found that lime had the property of precipitating soluble silica in an insoluble form, and of hastening the progress of the decomposition of carbonaceous matter, in order to form carbonic acid, for which the lime had a great affinity, and by this means the lime was converted into the insoluble carbonate, thus locking up for a time the food of these plants, and producing their decay, and, remaining inert in the soil until it was rendered soluble by a double dose of carbonic acid, it would descend into the subsoil and render a fresh supply of lime again necessary. Guano would not produce this effect, for its value being dependent upon the amount of volatile and fixed alkalies, as well as the phosphates, it would not convert the carbonic acid or silica into their insoluble modifications, or combinations, but would have a tendency to dissolve a greater portion of the silex, and set free a larger portion of carbonic acid. I have stated that the quantity of iron I found in the ashes of the gorse was no proof that iron was a necessary ingredient to the food of gorse; I would rather consider that it was carried into the circulation of this plant as an adventitious circumstance, being rendered soluble by the carbonic acid in abundance in the soil, and the fixation of the carbon and liberation of the oxygen left the iron insoluble in the tissues of the plant; in this way can we account for a greater portion of lime or magnesia existing in some plants in one locality than another.

The question was proposed with a view also to ascertain whether or not some other substance could supply the place of lime at less cost, and after repeated

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experiments I found that clay possessed the same property, though in a limited degree, and I recommended that, if it could be obtained at a cheap rate, it would form a valuable auxiliary to the use of lime, and by increasing the retentive and absorbent properties of the soil, would render them much more productive.

I will now mention one or two other little subjects of investigation. I was furnished by Mr. Johnson and Mr. Scobie with one or two specimens of a substance found imbedded in a rock of Old Red Sandstone, at the Elms Quarry, near Hereford. I produce a specimen of it—it puzzled those gentlemen to know what it was. I found, on analysis, that it contained no organic matter, and, when heated gently to a faint red, underwent no change; submitted to an intense heat before the blow-pipe, it merely became whiter in colour, and partially lost its lustrous appearance. I did not estimate it quantitatively (not having time), but I found it to contain peroxide of iron, alumina, lime, magnesia, and silica, with a trace of potash. From its analysis, as well as its external appearance, I decided that it was talc.

On referring to some chemical works which I possess I found a very accurate description of this substance given. It states there are two kinds; however, I will only mention the one nearly resembling the specimen. "In colour, white, greenish, or grayish; soft and soapy to the touch; much more tender and brittle than mica; does not effervesce with acids, and is soluble therein with difficulty, and consists of alumina, magnesia, silica, and sometimes lime and potash. It is sometimes used as crayon, as an ingredient in rouge, importing a softness to the skin, and is frequently used to give a fleshy tint to alabaster images."

I have been furnished with a specimen of coaly looking matter by Mr. Scobie, which I have examined. It contained, as near as possible, 50 per cent. of carbon, the residue is iron and sand, and from the external portion, having the combined iron simply as an oxide ($Fe\ O$) and the internal portion as peroxide ($Fe_2\ O_3$) I was led to believe that it was formed by the aggregation of carbonaceous particles, or decayed vegetation round a nucleus of peroxide of iron, and that the carbonaceous matter, in a state of decomposition, reduced the peroxide to a state of suboxide by the abstraction of oxygen for the formation of carbonic acid, and this would account for the difference of colours between the external and internal portions of the specimen. These are but little matters, but I have thought fit to bring them before you in the hopes that the accumulation of little facts would tend to the elucidation of others of greater importance.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, TUESDAY, JUNE 7TH, 1853.

EASTNOR CASTLE.

MEETING OF THE WOOLHOPE, COTTESWOLD, AND MALVERN NATURALISTS' FIELD CLUBS.

The first aggregate Meeting of the members of the three Clubs, formed to investigate the botany, geology, ornithology, and zoology of Herefordshire, and of the neighbouring counties of Gloucester and Worcester, was, by the kind permission of the Right Hon. Earl Somers, held in his Lordship's beautiful demesne of Eastnor, at the southern extremity of the Malvern range of hills, on Tuesday (7th June).

The continuous rain of the previous day—so acceptable to the thirsty soil and languishing vegetation—had cleared the sky, and freshened up the entire face of nature. Under a brilliant sunshine, the charming undulations of the scenery, the delicious hues and varied outline of the masses of foliage, the sweet soft green of the meadows, and the silvery glitter of the streams and pools, throughout the whole of the beautiful district lying between this City and the Malverns, were fully brought out. Although there was scarcely a breath of air in the early part of the day, the previous rain had given a pleasant coolness to the air, and it was not until about noon that the fierceness of the sun's rays began to be oppressive.

Unluckily, the philosophers were at that time engaged in toiling up the steep sides of "the Ragged Stone," and therefore they had full opportunity of testing in their own persons the effect of solar heat in the resolution of the human body into its constituent elements. This conflict between caloric and scientific devotion, however, ended triumphantly for the latter: the members gallantly weathered all the perils of the ascent, for which they afterwards duly awarded themselves by fulfilling the description of the poet,

"And greatly daring dined."

The meeting was altogether a most brilliant and successful one, the company numbering nearly sixty of the members of the three Clubs; and the addresses, delivered on the hills and at the dinner, being admirably lucid and instructive.

The idea of the gathering, which originated at the Whitchurch Meeting of the Woolhope Club last year, as reported in our account of that meeting, was heartily taken up by the Cotteswold and Malvern naturalists; and we trust that the meeting of Tuesday last will prove to be but the commencement of a long series of similar delightful and useful meetings.

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THE WOOLHOPE CLUB.

Our Herefordshire Club being the hosts, and the scene of exploration being within the limits of our county, we commence with their proceedings. A party of the members assembled at 6 a.m. at the Green Dragon Hotel, whence they were conveyed in a brake to the Somers Arms, Eastnor. On their way between Ledbury and the latter place, the song of that delicious warbler, the nightingale, was heard frequently. On reaching the Somers Arms, the members breakfasted, and then proceeded to transact their business. The chair was filled by the Rev. T. T. Lewis, the President, who, in opening the proceedings. made a very feeling allusion to the great loss which the Club had sustained by the sudden and lamented death of their late Hon. Secretary, M. J. Scobie, Esq., whose talent, business habits, perseverance, and integrity had procured for him the esteem of all who knew him. To Mr. Scobie's exertions the Club was indebted, not only for its formation, but for the remarkable success which had hitherto attended its proceedings. He could not trust himself to express his feelings at the suddenness and conflicting nature of the calamity with which it had pleased Providence to visit the family of their deceased friend; and would therefore pass from that topic to express his gratification at the prospect of the loss which the Club had sustained being likely to be made up, to a considerable extent, by a relative of their late lamented Hon. Secretary, who had kindly consented to be nominated as his successor.

Dr. Bull, in moving a resolution of sympathy with Mrs. Scobie, and the other relatives of their lamented friend, remarked that he fully concurred in all that had been said by their worthy President. The sudden death of their late Hon. Secretary, with whom he had had the happiness of an intimate acquaintance, had affected him more than he could express; and he felt how great a loss the Club had sustained in the death of one, whose talent and energy had done so much for it. In every relation of life, their late Hon. Secretary was all that could be desired: and he (Dr. Bull) had the greatest possible pleasure in submitting to the meeting a resolution, by which the Club's sense of the great loss which it had sustained by Mr. Scobie's death, should be recorded upon its minutes. He then moved:—"That the Members of this Club, before proceeding to the election of a Secretary, record their sense of the very great loss they have sustained by the awfully sudden removal of Mr. Scobie; and their united admiration of the sobriety and integrity which marked his public and private character. And that a copy of this resolution be presented to Mrs. Scobie, with the expression of the deepest sympathy of the whole Society, in the lamentable loss with which it had pleased Almighty God to visit her."

Mr. Flavell Edmunds seconded the motion, remarking that, from an intimate acquaintance with their late esteemed Secretary, he could also fully concur in the expressions of esteem and regret which had been uttered by the President and Dr. Bull. Since the formation of that Club, in particular, he had had abundant opportunity of seeing and admiring the excellencies of their deceased friend; and no death, out of the range of his own kindred, had shocked and grieved him more

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than that of Mr. Scobie. In so speaking, he felt that he simply uttered the sentiments of every member of the Club. The regret felt on the occasion of Mr. Scobie's death was universal throughout Hereford and its neighbourhood, but particularly was the loss felt in that and the other scientific insitutions in which their lamented friend was so active, so persevering, and so widely useful. He (the speaker) felt happy to have the opportunity of thus expressing the sympathy of this Club with the bereaved relatives.

The resolution was passed unanimously.

The Society then proceeded to elect an Hon. Secretary. It was moved, seconded, and unanimously agreed to that Mr. J. A. F. Suter, who has kindly discharged the duties during the vacancy caused by the death of Mr. Scobie, be requested to undertake the office. It was remarked that the coincidence of tastes and habits between Mr. Suter and his deceased relative, as well as the efficient manner in which Mr. Suter had performed the duties temporarily, pointed him out as well fitted to fill it permanently. Mr. Suter briefly acknowledged the compliment, adding that the melancholy reflections which crowded upon him rendered it quite impossible for him to say more than that he thanked them for the kind expressions of sympathy which had been uttered.

The meeting then balloted for new members. Messrs. F. Whitfeld and E. Morris, M.D., were elected. Two other gentlemen were proposed; they will be balloted for at the next meeting, which is to be held at Leintwardine on July 26th.

A statement of the quantity of rain which has fallen during the last twelve years was handed in to the Secretary by Mr. B. Boddington, of Bircher Court. It had been printed at the private office of that gentleman.

The following paper was read on

THE OCCURRENCE OF OOLITIC REMAINS IN THE GRAVEL OF CRADLEY, HEREFORDSHIRE,

BY THE REV. W. S. SYMONDS.

The members of the Woolhope Club will remember the announcement by the Rev. R. Hill, last summer, of his detection of liassic and oolitic remains in local gravel at Cradley. This detritus occurs at intervals along the valleys west of the Malvern range, and my object in this present paper is to prove that the current which transported it came from the north or north-east, and furnishes a well-marked proof of the setting in of a back water or small strait from the Teme Valley, by way of Cradley and Mathon; also that the other valleys in the neighbourhood of Eastnor must have had a communication with this strait, as the superficial deposits in the Netherton Valley, as well as at Ockridge, have furnished the same fossils.

Having examined the Cradley deposits, in company with Messrs. Strickland and Grainger, and collected from them gryphæa, terebratula, and other water-worn remains of the Lias, I proceeded to examine the next locality where gravel

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occurs in the parish of Mathon; and although I saw no pits open, I succeeded in establishing the fact in my own mind, by observations on the sides of lanes, and collecting Lias erratics that had been dug up by the cottagers.

Now, the occurrence of these remains at all on the western side of the Malverns seemed to me so important, that I wrote to Sir R. Murchison, mentioning the discovery, and requesting the favour of his opinion. In reply, Sir Roderick wrote as follows:—

16, Belgrave Square, June 3, 1852.

My Dear Sir,—I do not think that the occurrence of Liassic and Oolitic fragments and remains at Cradley would indicate clearly what I mean by the northern drift.

The probability is that such materials come from the S.W. It is difficult now-a-days to bring to the mind's eye the country covered by the waters at the period of the Straits of Malvern; but I see no great difficulty in imagining a western bay of the same Straits extending from Gloucester by Ledbury to Cradley—a back water. I am not very fond of reasoning too much on existing outlines; but the facts you mention, and the form of the ground, might favour the view I should be disposed to adopt.

In this way, eddies from the Straits of Malvern might certainly carry some true northern drift to the localities in question, but the Lias and Oolite have probably travelled only from the banks of the Severn. Pray do not attach any value to this surmise, and believe me, yours very truly,

RODK. I. MURCHISON.

My observations have led me to form a contrary opinion.

On the 8th of March I visited the gravel pits between Eastnor and Clincher's Mill, which lie quite at the extremity of the Malvern range, and, after a careful search for two hours, was unable to find any erratic of the Lias or Oolite. The Clincher's Mill pits are nearly twenty feet in depth, and the beds are for the most part in regular layers. The lowest of all is very interesting, and for some time it is difficult to divest oneself of the idea that it is not a rough underbuilt wall; it is entirely made up of large angular fragments, in a half stratified mass, and consists of slabs of syenite, Caradoc sandstone, Ludlow and Wenlock rocks, and here and there a trace of greenstone and Hollybush sandstone. These fragments have no appearance of being water worn. I found no trace of Cambrian pebbles; the beds are entirely made up of detritus from the neighbouring hills. Above these, several beds appear in succession, and the higher we ascend the evidences of attrition become more apparent; but the fossils I collected were all local, and must have been washed out from the local rocks. It was only in the upper layer, not more than three feet below the alluvium, that I could find any trace of the northern drift. This was associated with fossils of the Silurian rocks, and consisted of water-worn pebbles of the well-known Lickey quartz and other altered sandstones. In the same layer with the rounded erratics laid before you this day, I found remains of pleurotomaris, orthides, terebratula Wilsoni,

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but no signs of the fossils of the Lias and Oolite we obtain at Cradley, Mathon, and even as far as Netherton. The presence therefore of these fossils with Lickey quartz pebbles in great abundance at the southern extremity of the range of valleys. and their absence at the northern portion of the district, has suggested to me the idea that the depositing currents really set in from the north. Why should not the detritus of Clincher's Mill contain the Liassic and Oolitic remains equally with the vale of Cradley? We know that, the Lias extending on the east of the Malverns, at least as far as the Berrow Hill, had a current set in by way of Haffield Camp and the south side, we must have found the remains in the local deposits of that valley.

The business having concluded, the members proceeded to visit the beautiful Church, restored by the late lamented Earl Somers, and the highly interesting gardens attached to Eastnor Castle, which had been kindly thrown open to their examination by the present Earl. The beauty and taste displayed in the Church, not less than the rarity and beauty of the plants in the greenhouses, &c., elicited general admiration. The great number of immense Mexican aloes, which were ranged in a long line on one of the walks, was a most remarkable spectacle.

THE MALVERN CLUB.

The members of this newly-formed, but strong and vigorous, Club met about 10.30 a.m. at the Somers Arms. The President—the Rev. W. S. Symonds, Rector of Pendock (who is also an active member of the Woolhope Club)—filled the chair.

THE COTTESWOLD CLUB

arrived soon afterwards, under the leadership of B. Baker, Esq., their esteemed President.

VISIT TO THE RAGGED STONE HILL.

The three-fold gathering of naturalists now poured forth, in a series of little knots, along the road leading from their inn to Howler's End Hill. Here they were joined by Mr. W. E. Strickland, Deputy-Reader in Geology at Oxford, who directed the making of a small experimental incision into the Black Shale on that hill, with the view of exploring for impressions of the Asaphus caudatus, a small trilobite. Some very good impressions of parts of the skeleton were found, but the time at the disposal of the members did not permit of any extended search.

The members proceeded to the Ragged Stone Hill, commonly but incorrectly called the Gloucestershire Beacon, upon the steep and lofty summit of which they seated themselves for some time to admire the wondrous and magnificent panorama presented to them. Some perhaps amid their philosophy, touched by a spice of the martial enthusiasm of the day, and the remembrances of the stirring times when

"Twelve fair counties saw the blaze on Malvern's airy height,"

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might even be led to echo the celebrated exclamation of George IV., in reference to the lovely district which bounded the western horizon of their view:—"By Jove, this is a land worth fighting for."

Passing over the ripple-like ridges of Eastnor, and the white towers of the castle, mirrored in the quiet lake, the eye ranged over the whole county of Hereford, with parts of Shropshire, Montgomeryshire, Radnorshire, Breconshire, and Monmouthshire. From the high table-land of the Clee Hills on the north, to the Blorenge and the Scyrydd-fawr on the south, and far west over the pretty town of Ledbury, nestled in foliage, the isolated hill of Shucknall, the blended summits of Credenhill and Lady Lift, to the lofty Radnor Forest, the two peaks of the Gadr, and the cone of the Pen-y-val, the beautiful land lay smiling in the summer sunlight. Turning eastward, the high rim of the Woolhope basin led the eye to the lofty enclosing range of Dean Forest, to May Hill with its diadem of trees, to Robin Hood's Hill, the "fair city" of Gloucester, the Cotteswolds, and the broad out-lying mass of Bredon Hill. The vale of the Severn, studded with village spires and towers, as far north as Worcester, lay spread out like a map, while far in the dim distance, the Lickey Hills bounded the view with a cloud-like mass.

To the eye of the geologist, the scene was suggestive almost beyond description. At one sweep, the eye passed down a long vista of distinct creations; the physical history of myriads of ages lay unrolled, as it were, before him. The grandeur of the conceptions thus suggested, blended with the picturesque history of the scene, give to the view from Malvern an almost unique interest. It has, however, another and a hardly less potent attraction to the geological student: Malvern is classic ground. By painful and long pursued investigation, here Murchison gradually mastered the mysteries of the Silurian system; and half the interest of his colossal work rests upon discoveries made at the western base of the Malvern ridge. After enjoying the view for a short time, the party were gratified by a very clear and beautifully delivered

LECTURE BY MR. STRICKLAND

on the geology of the scene presented to their gaze. Mr. Strickland began by describing the nature of the range of hills upon which they were then assembled, remarking that it is composed by a mass of syenite, a rock of igneous origin, which had been forced up from beneath at a very early period of geological history, subsequent to the formation of the strata deposited on its western side, but long anterior to the time when the eastern strata were formed. In the syenite, fragments of gneiss and mica schist are found, and the whole substance of the rock seems to be composed of fragments of older rocks in a partially fused state. The sandstones, shales, and limestones, which lie obliquely against the syenite on its western side, do not seem to have been altered by contact with it, although in various cases the edges are in close approximation, hence he inferred that the mass was forced upward after having cooled; while the regular, almost horizontal, deposition of the rocks on the eastern side proves that the elevation

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of the ridge must have taken place at a time when the country on that side was below the level of the sea, by the waters of which those rocks were subsequently deposited.

The tract of country to the westward, being composed of the Old Red Sandstone and Silurian Rocks, belongs to and represents the palæozoic or most ancient period of the existence of our earth; while the strata eastward of the Malverns, belong to the mesozoic, or middle ages of geologic history. Looking westward, he pointed out the remarkable manner in which the strata between the syenite and the Old Red Sandstone of Herefordshire are arranged in rude concentric semicircles, having the hill on which they stood for their centre; the shales, being softer, had been hollowed out by the action of water into valleys, while the harder materials, resisting that action, had been left as ridges. Curving round the immediate base of the hill is an undulating valley, the stratum in which is the Black Shale of Howler's Heath. Beyond this, at a distance of about one mile, runs a low ridge, terminating at the hill to their right, another of the summits of the Malverns, called Holly-bush Hill. The substance of this ridge is a sandstone which Sir Roderick Murchison has named, from its termination, the Holly-bush Sandstone. Beyond this is a second valley formed of the Caradoc Sandstone (so called from Caer Caradoc in Shropshire, where it is also found), which also extends part of the way up the next ridge, of which the Obelisk Hill is part. The next valley is composed of the Wenlock Shale, beyond which is the long hill called the Ridgeway, composed of Wenlock limestone. Westward of this are found the Lower Ludlow Shale, and then a ridge composed of the Aymestrey Rock; then the Upper Ludlow Shale, and then the Upper Ludlow Rocks. Next to these lies the Old Red Sandstone of Herefordshire, with the isolated hill of Silurian rock, called Shucknall.

The force exerted in the elevation of the Malverns has left many evidences in the disturbance of the strata; and the semi-circular arrangement shows that the centre of the disturbing force was in the Ragged Stone Hill. Far to the north may be observed the elevated range of the Clee Hills coal-field, and to the south, the similarly elevated coal-fields of Dean Forest; and it has been demonstrated almost as clearly as was possible in geology, that these two patches formed the remains of a vast coal-field, which with the other strata of the Carboniferous system, once covered the whole of Herefordshire. For a height of at least two miles and a half, these strata once stretched above the present surface of the district; but it was afterwards submerged in the sea, and the combined action of the water and the atmosphere broke down and swept off the whole of those strata. Prior to that event, the elevation of the district must have been about that of the Alps, but with the exception of the Clee Hills and the Forest of Dean, the whole of the Carboniferous strata have been swept off into the depths of the Atlantic Ocean. After that denudation the surface was again raised above the level of the ocean, and the Malvern Hills formed a bold coast to the Straits of Malvern. The tremendous convulsion which thus raised the western side has produced probably the most stupendous "line of fault" which is known to have occurred anywhere.

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Turning to the eastern side of this ancient sea-coast, the lecturer pointed out the broad vale of Severn, formed on the surface of the New Red Sandstone, and bounded to the eastward by the Blue Lias, a deposit of mud in the waters which once covered the district; and beyond it the high range of hills, with the outlying masses of Bredon Hill, Robin Hood's Hill, &c., composed of the Oolite. From that spot, no part of the Wiltshire Hills was discernible; but, after passing the Oolite, they would come next upon the Cretaceous system, or chalk; and after that upon the Tertiary system, until they reached the London clay, and the formations which contain remains of animals and vegetables most nearly resembling those of the present system. The lecturer closed, amid applause, a most interesting address, of which this is a mere summary, by referring his hearers for details to the great work of Sir R. Murchison, "The Silurian System."

The assemblage then proceeded, under the guidance of Mr. Strickland, to visit quarries on the Holly-bush sandstone, the Caradoc sandstone, the Wenlock limestone, &c., and at each place, the energetic tapping of several scores of hammers must have considerably startled those celebrated personages, the genii locorum, unless indeed they had taken a mid-day nap in some of the few wooded dingles which were not visited by the enthusiastic philosophers. In the Caradoc sandstone, at the base of the Obelisk Hill, specimens of Arca Eastnorii, Lingula, Fucoids, and other characteristic fossils were found by some of the party. At a quarry of Wenlock limestone, several remarkably fine corals, madrepores, &c., were found, and carried off in triumph by members of the various Clubs, to grace the museums of Worcester. and the private collections of the explorers. After crossing the Ridgeway, the geological section of the party made their way to the Inn, to await, with appetites sharpened by the pure air and eager explorations of the morning, the arrival of their botanical confreres, and of the dinner so much needed by both.

During the interval, a collection of beautiful specimens of the principal fossils of the Silurian rocks was exhibited by the Rev. W. S. Symonds.

THE BOTANICAL SECTION,

under the guidance of Mr. Edwin Lees, F.L.S., of Worcester, took the same route as the geologists, until they reached the Ragged Stone Hill. From that point they made their way into the many beautiful rocky and wooded dingles lying between it and the Ridgeway. On their way they gathered, in Holly-bush gully, some rare lichens, carices, and ferns, among which were Jungermanniæ, Carex strigosa, &c.; on the hill, the singular Adder's-tongue fern, Ophioglossum vulgatum; and in other parts of their rambles, Trifolium striatum, Geranium columbinum, Aquilegia vulgaris, Moenchia erecta, Ranunculus parviflorus, Lepidium Draba, Arenaria rubra, Vicia angustifolia. Professor Buckman, of Cirencester College, remarked that, so far from this last named plant being, as was commonly supposed, a distinct species from Vicia sativa, he is now raising good agricultural vetches from this supposed different species. In the woods of the Ridgeway

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Hill, the party found a cluster of not less than seven very fine specimens of the Broom-rape, Orobanche major; and in the Park, the lesser Burnet (Sanguisorba). At a distance of about 300 yards N. from the Lodge, they found one of the oak trees upon which the mistletoe grows, of which only three (we believe) are known in England. This plant grows in no less than six places upon the tree, and a singular effect is produced by the mistletoe alone being alive in the upper branches, those parts of the tree being quite withered.

The Rev. J. H. Thompson, of St. Nicholas, Worcester, brought to the meeting for inspection some very interesting specimens of rare British plants which he is cultivating in his garden. Amongst them were Carex montana, Geranium sylvaticum, Impatiens Noli-me-tangere, Poterium muricatum, &c. Dr. Bull, of Hereford, brought specimens of Bird's-nest Orchis (Neottia nidus-avis), &c., gathered near this City.

THE DINNER

was a plentiful one, served up in a creditable manner. The chair was taken by Mr. B. Baker, President of the Cotteswold Club, and the vice-chair by the Rev. T. T. Lewis, President of the Woolhope Club. Among the company were Mr. Strickland, Rev. B. Brodie, Professor Buckman, Dr. Wright, Mr. Lees, Rev. W. S. Symonds, Rev. G. Davies, Vicar of Tewkesbury, Rev. R. Holmes, Eldersfield, Mr. T. Lee Warner, Capt. Guise, Mr. Hewett Wheatley of Hereford, Dr. Bull, Rev. J. H. Thompson, Rev. R. Hill, Mr. W. H. Purchas, the Hon. Secretaries of the Clubs, &c.

The healths of the Queen, Prince Albert, and the rest of the Royal Family having been drunk, the health of the Chairman was next given, followed by those of the Vice-chairman, and the Rev. W. Symonds, as the Presidents of the two junior Clubs. In reply to the last-mentioned toast, the Rev. W. S. Symonds delivered an excellent address on the practical value of geologic studies.

The health of "Sir R. Murchinson and the Honorary Members" was responded to by Mr. Strickland, who explained that Sir Roderick's absence was due to the singular coincidence that on that very day, and at that very time, he was engaged at the Oxford Commemoration, receiving the deserved honour of the degree of D.C.L. (applause). After alluding to the interesting fact of the Meeting of the Clubs on the ground rendered classic to geologists by Sir Roderick's work on the Silurian system, which would hand down his name to posterity, Mr. Strickland remarked that, if Sir Roderick was the father of that system, the Rev. T. T. Lewis, by his previous extensive and valuable researches, was justly entitled to be called the grandfather of the system (laughter and applause).

In returning thanks for the toast of "the President of the Woolhope Club," the Rev. T. T. Lewis neatly acknowledged the compliment paid him, and expressed a hope that these united meetings would recur annually.

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Mr. Lees proceeded to read a paper on "The Plants that more particularly flourish on Silurian limestone."* The Rev. G. Davies, of Tewkesbury, then read an elaborate paper on "The migrations of the house-martin, swift, and sand-martin." He argued that their migration was not governed by the weather, but by the instinct which led them to seek a country in which a sufficiency of their insect food could be found, at the time of year when it is no longer to be obtained in England. He combated very effectively the notion that some swallows pass the winter in a state of torpidity in this country.

The next paper read was by Mr. Wheatley.

Thanks were voted to Mr. Wheatley for his excellent paper, with a request that he will permit the Club to publish it in extenso. A vote of thanks to the Chairman closed the proceedings about half-past nine p.m., and the company shortly afterwards separated.

ADDRESS BY THE REV. W. S. SYMONDS.

To the gentlemen of the Cotteswold Club, who would recall the great general apathy that formerly existed in the public mind respecting natural history, the Eastnor Meeting must possess a particular interest, and a peculiar value and signification. The sister counties of Hereford and Worcester had other institutions and societies well adapted to carry out the ends proposed; but as a Society engaged in the personal investigation of natural science, as a society formed for the sake of the personal observations of the rocks of the mountain, the birds of the air, the plants of the field, and the habits and wonders of the insect world, the Cotteswold gentlemen had, until lately, stood alone, and they would therefore thoroughly appreciate the formation of the Woolhope and Malvern Societies, which were established on the same system, and were conducted on the same plan.

Until lately the study of natural history had scarcely been recognised in England as a public study; and I was sure that many of the gentlemen present would agree with me, when I said that we most of us had closed our educational career without once having had our attention directed to those subjects, which are, after all, the most intellectual as well as the most interesting.

The system of training is chiefly confined to the classics and mathematics, and the consequence was, we went forth to our different spheres of duty as ignorant of the great volume of nature, or, in other words, the book of God's works, as if the world were made up of no other articles than the Latin, and no other particles than the Greek; not that I would for one moment wish to depreciate the value of the classical and mathematical literature—it is the one-sided system that is to be lamented, and the absurdity of confining the system of education, and the acquisition of University honours, to those subjects alone.

* This paper, revised by the Author with additional matter, is to be found in *Transactions* of the Malvern Field Club, pages 15 to 28, which were published in 1870. See also that pleasantly written work "Pictures of Nature in the Silurian region around the Malvern Hills," by Edwin Lees. Excursion III., page 49, published 1856.

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These prejudices are passing away; and although there is amongst a certain class of society, unacquainted with the facts of science, some popular fear lest certain branches of natural history subjects should tend to scepticsm, those prejudices are also disappearing as men begin to grapple with subjects that at first are, of necessity, visionary and dim. It is not an easy thing to throw overboard the lessons of childhood and the instructions of youth; yet most of us, when we entered upon the study of those high subjects, had to confess that much that we had hitherto learned was false. And in the communication of scientific knowledge, and lending an impetus to the study of the natural sciences, I said I believed that the formation of such societies would have a beneficial effect in every county in which they were established; and in endeavouring to advance these subjects we should remember by whom we had ourselves been taught.

The honorary members, Murchison, Sedgwick, Strickland and others, had been, by their writings, beacon lights to us, and we should endeavour to make them so to others; for most of us had learned by experience that there is a philosophy that is false, as well as a philosophy that is true—that there is a philosophy that elevates, and another that misleads, just as well as that there is a system of reasoning that perplexes and confuses, as well as a system that instructs.

I then said I conceived that much service might be rendered by our societies in matters of every-day life, for there is no department of science that has not some ties with the common business of life.

I mentioned instances in which geology had been, and might be again, useful in preventing absurd and useless expenditure in mining speculations, as the localities most favourable for the segregation of minerals were every day becoming better defined. The perusal of certain elementary works of geology might convince the agents of a noble Earl, in an adjoining county, that their intention of boring for coal in the Lower Lias, would be rather a remarkable proceeding in these days; they would learn that they would have not only the whole of the New Red System to sink through, but sundry coal measure clays and sandstones, before they came to sufficient of that mineral to pay for a box to put it in (laughter and applause).

I then mentioned how generally useful the practical chemist of our societies might be, as well as the geologist and botanist, as there is not one of those sciences that has not a direct practical influence on agricultural enterprise. The farmer is constantly taken in by the purchase of artificial manures (hear, hear). Guano had been sold which had not one particle of the genuine article in its composition; the newspapers teemed with advertisements of the nitrate of this, and the phosphate of that; and would not the Clubs be of practical service to the agriculturalist, if we could ascertain for him the chemical compounds of these nostrums, and, if genuine, whether they were adapted to the soil to which they were to be applied?

The Old Red clays of Herefordshire must require a very different chemical agent to the Ryelands of the Worcestershire New Red; and not a hundred years

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ago, in my own neighbourhood, marl-pits were sunk in marl land, to manure marl soil, a proceeding not altogether agreeing with the laws of agricultural chemistry, and somewhat analogous to the old school-boy adage of giving bread to bread and cheese to cheese (laughter and applause). So now, we continually see lime used upon soils upon which it is entirely thrown away, while upon land on which it might have a beneficial effect, it is never used at all. Under such circumstances as these I said I believed we might often be of service to the agriculturalist, and carry the helping hand of science into the ordinary pursuits of men; but as I said before, there is no department of science that has not its ties with the ordinary business of life, and there is no business entirely independent of science; and so it matters not amongst what class of persons the different members of our societies may be thrown.

By our not disdaining to assist the school-boy in his arrangement of natural history specimens—by our inculcating by every means in our power, the growing thirst for natural history—by assisting, through such means as lectures and explanations of fossils, minerals, chemical compounds, and plants, the communication of scientific knowledge, I believe we might become the means of awakening many of our fellow men to a consciousness of the value of our pursuits, and the utility of their results (applause).

ON THE PLANTS WHICH FLOURISH ON SILURIAN LIMESTONE.

By EDWIN LEES, A MEMBER OF THE MALVERN CLUB.

There are many plants that indicate limestone in the localities where they grow, or flourish most luxuriantly on a calcareous soil, so that an experienced botanist at once recognises them, and knows the nature of the ground he is on from the very circumstance. The Traveller's Joy (Clematis Vitalba), the Lady's finger (Anthyllis Vulneraria), Saintfoin (Onobrychis sativa), Yellow-wort (Chlora perfoliata), wild Marjoram (Origanum vulgare), and the Wayfaring tree (Viburnum Lantana), all abundant in this district, are familiar instances; and many others might be named.

Botanical travellers have all made the remark that on limestone vegetation assumed a peculiar character, and that calcareous strata possessed plants different from all other soils. This has been noted even in America by Von Martins; and Wahlenberg, in his "Flora of the Carpathian Mountains," has enumerated 43 species of plants that he only met with upon limestone.

Now I must here make the passing remark, that our Sisyphean rock-rolling and stone-breaking friends, the geologists, may here get an up-lift from the humble exploring botanist, who might in a strange place tell them where to look below for fossil remains from the appearance of a little flower, even before they were themselves aware of the formation they were on from the appearance of the *magna ossa parentis*, the great ribs of our mother earth, elevated and laid bare before them by some dyke or protrusion of the strata beneath. Indeed, a change of rock may be indicated by the sudden and unexpected appearance of plants not partial to limestone, and which have other affinities. Thus, when flying about like a

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thistle-down some summers since, and resting for a short time among the vast Carboniferous Limestone masses of the Great Orme's Head in Carnarvonshire, I one day wandered to an isolated hill called Craig Diganwy, where, to my surprise, tufts of Foxglove appeared in lofty splendour, as they do in such luxuriance on our Malvern Hills, but keeping clear of the limestone. "Why, good gracious," I exclaimed, "I seem got back to Malvern," and on examining the ground, I soon found I had unconsciously wandered to a mass of trap-rock, and there only did the Foxglove present itself to view, for not a single specimen did I anywhere find upon the limestone, while the Gentian, the Rose, the Marjoram, and the Spiraea Filipendula as cautiously kept out of the trap (a laugh).

The botanist, therefore, always feels pleasure in treading upon limestone, because he knows that many plants can there be found with certainty not easily obtainable elsewhere, and some of these are very local, as the Cotoneaster, found on the Orme's Head; Thlaspi perfoliatum, a Cotteswold plant; Carex humilis, on St. Vincent's Rocks; C. digitata, on the limestone ledges of the Wye, near Symond's Yat, and others that might be mentioned. Our Silurian limestone nourishes Pimpinella magna, Linaria minor, Orchis pyramidalis, and Ophrys apifera, Cnicus eriophorus, Gentiana Amarella, Avena pubescens, and the local wood Lyme-grass (Elymus europæus).

This, then, points out the advantage of cultivating kindred sciences, and maintaining friendly relations with geological explorers, since in their company hints may be obtained useful in practical researches, and mutual rubbing up polishes both parties and takes off the absorbing, overweening rust that is apt to gather sometimes about a man, like grey lichens on an old apple-tree, when too over-shadowed by a single engrossing subject.

Most of the British plants partial to limestone may be found in our Silurian woods, or on the exposed rocks that are brought up by the Malvern syenite; yet there are special exceptions not easily to be explained, but which give a value to local researches, and impress a pleasure on local explorations. Thus the White beam-tree (Pyrus Aria) that grows on the Oolitic rocks of the Cotteswolds, and is such an adornment to the grey, romantic precipices of the Wye, is not anywhere seen in the Malvern district; but, in exchange, we get beautiful clumps of glaucous fragrant Juniper, which is scarcely found on, if not altogether absent from, the banks of the Wye. The Columbine (Aquilegia vulgaris) forms quite a feature in many of our Silurian groves and woody borders, but is very rare indeed in the Cotteswold woods, only one locality for it being given in my friend, Professor Buckman's "Flora of Cheltenham." The differences between local Floras would, however, lead us insensibly into too wide a field of observation; but I may here remark that the Autumnal-flowering gorse (Ulex Gallii) that grows on our Malvern Hills in such extensive and wide-spreading prickly tufts, is unknown or unrecorded upon the opposite Cotteswold cliffs of the ancient Malvern Straits.

For a moment let us glance at the characteristic vegetable aspect of our Silurian woods in the summer time, after the countless wild daffodils with which they are crowded in early spring, the Snow-drops, the Blue-bells, the numerous

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Hairy violets (V. hirta), and the lurid four-leaved Parises (very abundant) have in a great degree passed off. Roses and Sweet-briars now rise in beauteous profusion—the Rosa micrantha and R. villosa especially—about the Wenlock limestone quarries; and we have also the rare R. sepium at Little Malvern. For Rubi, I need only refer you to my "Botany of Malvern," where there are prickles enough, sharpened up and described perhaps "too numerous" for any but the enthusiastic thicketeer to encounter. For perhaps you may say, with Dr. Warren in his "Ten Thousand a Year," "He wants me to scratch my hands in a bramble-bush only to get blackberries for himself."

But the beautiful Wood-vetch cannot be easily passed by. This fills the hilly woods near Ledbury with its graceful tresses, hanging in festoons about the trees, its purple-streaked blossoms fitted, as Scott says, to canopy Titania's bower. Then on the exposed limestone the golden Cistus in profusion, the Bee-orchis, and the purple Pyramidal show beautifully, with the Yellow-wort and Picris hieracoides; while extensive masses of the great purple Knap-weed (Centaurea Scabiosa), the bright Saintfoin, and the yellow flowers of the Melilotus officinalis combine in spreads of gold and purple to adorn the undulating scene of hill and dingle.

Among the few bogs yet remaining, where springs gush out to murmur along the deep limestone gullies or old hollow ways, the purple Pinguicula appears with the red viscid Sun-dew, the delicate pale Bog-pimpernel, and a few—very few—Cotton-grasses, with many Carices and Blysmus compressus, that have escaped destruction from the too-rapacious hands of the exterminators, who too often strip bare the bosom of the earth as remorsely as geologists tear out its entrails. (A laugh.)

The natural crest of the Ridgeway in Eastnor Park, splendidly wooded as it is on either side, with the grand Camp Hill towering above, once covered with painted Britons under the eye of Caractacus, is invested with exciting interest both to the geologist and the botanist. Earl Somers has most judiciously retained this old British roadway always bare at the summit, as a winding drive to the Castle from the Chance Pitch Lodge. Gloomy Yews of indigenous growth, that have outlived many an eagle's life, and certainly exceeding five hundred years in age, overshadow parts of the road like a glen devoted to the Furies; in other parts glaucous-green Junipers adorn the scene; Oaks everywhere robe the acclivities, and in one secluded spot appears high up on its supporting dryad, that "aureus ramus" of mythologic fame, honoured by the Druids as "Pren Awr," or the celestial plant, because believed to have dropped from Heaven, though now known only as the Mistletoe, or mingled bush.

But to return to the subject of plants particularly attached to a calcareous soil. From numerous plants having been observed to be almost peculiar to limestone, it has been suggested that geological formations exercise such a remarkable influence upon vegetation, that they may be discriminated thereby; and some attempts have been made to do this, but close examination proves the idea unsustainable, as the influence exercised on vegetation appears to be really mineralogical and chemical. Thus the Lady's finger (Anthyllis Vulneraria) and the Clematis are

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as abundant on Lias as on Silurian limestone, and the former, as I recently noticed, is equally at home on the Carboniferous limestone of South Wales. The Yellow wort (Chlora) is as common too on the Wye Cliffs as it is about our own exposed shales. The little Squinancy wort (Asperula cynanchica), though absent at Malvern, grows on the Cotteswold oolite, but is more luxuriant and plentiful still on the Carboniferous limestone of South Wales. The pretty Bee orchis and O. pyramidalis, devoted as they are to a limestone soil, yet seem to know no difference between the Devonian and the Silurian, and are found as well on the Lias, nay, they flourish even where there is only a thin coating of modern travertine on the fundamental rock, as at Tedstone, Herefordshire, on the northern margin of this district. Yet some Orchideæ are almost entirely confined to the chalk formation; while the Cornish heath (Erica vagans) in our own island, revels entirely upon the serpentine of the Lizard, to which rock it is curiously restricted. Nevertheless, some plants are so peculiarly isolated, apparently without reference to soil, that the manner of their location is not easily explainable. Potentilla rupestris in this country never strays from the heights of Craig Breidden*; and a little plant named Origanum Tournfortii has never been found anywhere else but on the island of Amorgos in the Mediterranean. The Fungus meliteus is also on the rock of Lagos. Other singularly limited plants might be mentioned, as the Handtree of Mexico, and the Cedron of New Granada, Neckera crispa on the Cotteswolds and Devon; but nearer home, several mosses, as the Encalypta, incline only to calcareous soils. Where nature has retained its stern pristine aspect among remote rocks and wild fells "unknown to public view," upon desolate granitic heights and unaltered igneous rocks, it might not be unreasonably expected that characteristic plants would appear independent of their altitudinal character, and this is the case; but unfortunately they do not remain only there, for as secondary and tertiary rocks, as well as erratic gravel, are nothing more than modified ancient rocks, plants are perpetually migrating, and thus many species are equally found on igneous rocks and on gravel.

If the more ancient rocks were really elevated above the waves for ages prior to the secondary or mesozoic strata, it would appear perhaps not improbable that vegetation, first appearing upon them, would still remain indicative of the earliest races of plants now in existence. But the migratory nature of plants foils any attempt at demonstration here, since the newest rocks may possess a vegetation more luxuriant than the most ancient, though derivable therefrom; and Lyell has recorded that Monte Nuovo, near Naples, whose birthday has been historically recorded, bears a more splendid and luxuriant load of groves of Arbutus than any of the older hills around. Hooker and Arnott have suggested that our own flora is altogether derivable from continental sources, though surely rocks of Sedgwick's Cambrian system must be as ancient as any in Europe. One plant only, Vicia lævigata, appears in our flora as having been found nowhere else in the world than Weymouth.

Perhaps, however, the humble lichen tribe give some indications as remarkable, if not more so, than the phanerogamous or flowering plants. These are so

* In Montgomeryshire

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chained down to the rocks on which they grow that they were called by Linnæus Vernaculi, or bond-slaves, as being unable to escape; and as they are indestructible, with whatever reverence a forest tree two thousand years old may be looked upon it might be possible to find lichens twice as ancient where the surface of the rock has not been degraded by imbral influence, or shattered by the hammer of the geologist or the blast of the lime burner.

Some lichens especially affect granitic rocks, as Urceolaria cinerea, Lecidia atrata, sulphurea and glaucoma, Lacanora coccinea and tartarea, Parmelia omphalodes and stygia, and especially Umbilicaria pustulata, plentiful on the harder Malvern syenite, and giving the rocks a carbonic aspect, as if covered with soot, or half burnt with fire.

Then there are others only to be found on limestone or calcareous stones, such as Endocarpon miniatum, rare here, but plentiful on Backbury Hill near Hereford, Endocarpon Hedwigii, Urceolaria calcarea, Lecidea immersa, pruinosa, rupestris, &c., and particularly Squamaria crassa, Collema nigrum, sinuatum, and other Collemas.

Now I feel inclined to make the suggestion from these lichens being thus imprisoned, as it were, from the very beginniug of the present geologic period, on their respective rocks, that they really have arisen first, or been created first, if you prefer the expression, on the phytological stage of life; since whatever time was engrossed by creative power, there must have been an order of detail. Now in the present day, we may notice anywhere, if a castle or abbey falls to ruin, or an old limestone wall is left to mature, the coloured yellow, grey, and black lichened washes of old time first appear to harmonise the walls and lay on a ground tint; then come the fleshy and thalloid warty lichens; mosses and ferns follow, while wall-flowers and other plants rise in succession, till shrubs and trees shadow the walls with their denser foliage, as they do now the broken arches of Netley Abbey and Tintern, till they become bushy as wild cliffs themselves. So Byron says of the walls of Rome and the palaces of the Flavian Emperors:—

> "The trees that grow along the broken arches
> Wav'd dark in the calm moonlight, and the stars
> Shone 'midst the rents of ruin—
> Some Cypresses along the time-worn breach
> Appear'd to skirt the horizon, but they stood
> Within a bow-shot where the Cæsars dwelt
> Now dwell the tuneless birds of night midst groves,
> That spring through ruin'd battlements
> And twine their roots with the imperial hearths."

In like manner, then, I feel inclined to suppose, seeing how nature now acts, that on the emergence of the older strata, lichens, and cryptogamic tribes preceded in the order of advancing vegetation the flowering plants and forest trees; but in throwing out this hint as a probability, I altogether deny that transmutation theory, that considers it possible a palm or a forest tree could be developed from

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a moss or a lichen left to manage its own affairs on a desert island. The subject I have cursorily touched upon—the limitation of plants to certain soils and rocks —you must admit is well deserving of attentive examination. I do not profess to have now extensively treated it as the theme deserves—our limited time would not permit it—but I have merely produced a few burs of observation carried off while passing through the thickets of research; and if, perchance, some of them stick to any friends I have now the pleasure of addressing, they may possibly, stored in thoughtful ground, germinate in due time, and like plants migrating to a richer soil, produce double flowers, exhale a richer fragrance, and rise in fuller luxuriance than when located on the original barren shales of their birthplace. At all events, as the humblest weed produces seeds of some kind, which are scattered about as if uselessly by the idle winds, and yet the little birds find them out, or they come up where least expected, so every winged thought takes its course, and lives its life over again in the minds of others to some useful purpose.

So concluding in the homely, but quaintly impressive language of one of our almost-forgotten poets, I may say—

> "There's not a tree, a plant, a leaf, a blossom,
> But contains a folio volume; we may read
> And read again, and still find something new,
> Something to please, and something to instruct,
> E'en in the humblest weed." (Applause).

Upon the subject thus quaintly and amusingly started by Mr. Lees, a conversation ensued, in which Mr. Strickland, Professor Buckman, and other gentlemen took part. Mr. Strickland expressed his conviction that the distribution of plants was rather mineralological than geological. The plant chooses limestone, not any particular formation of it. Provided it contains the required mineral, the plant does not care twopence about the age of the rock. (Laughter and applause). It was agreed, on the motion of Dr. Wright, that a Committee, consisting of Professor Buckman, Mr. Lees, and Mr. W. H. Purchas, be appointed to prepare a Flora of the district.

REMARKS ON THE ICHTHYOLOGY OF HEREFORDSHIRE.

By Hewett Wheatley.

In a short paper of this kind, it is impossible to enter upon even the briefest preliminary sketch of the Natural History of our British Fishes; with a few incidental observations, therefore, on Ichthyology in general, the following will be confined to the species of this county—Herefordshire.

One of the most striking curiosities of Natural History, is the close approximation of a higher order, to its immediate inferior—the nicely graduated degrees in the scale of being.

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In the present subject—the lowest of the vertebrates, fish—there is established a clear deduction from its inferior—the highest invertebrate class, the Cephalopodus mollusks. The lowest rank of fish, the lamprey, has only a rudimental skeleton, a sort of gelatinous cord. Its affinity with the mollusk, is not only recognised in the skeleton, but in the skin, which ejects an abundant secretion when the animal feels in danger; in the process of respiration being carried on through the gill-apparatus, independent of the mouth; and from the eight filaments extending round the lips of some species; which Professor Owen considers "to represent the eight arms of one of the mollusks (Cephalopoda Dibranchiata), but arrested in their development, by reason of the preponderating size of the caudal extremity of the body, which now forms the sole organ of locomotion." One of this family—the lancelet—is the lowliest of all fishes; its organization is so very humble, that it has even been mistaken for a mollusk, and not of the highest class either. Here then we see the fish emerging from a lower grade by an almost imperceptible gradation; and the connection with a higher, the reptiles, is clearly established in the salamander and the frog, whose early lives are passed as fishes; for the tadpole, whether the young of the salamander or the frog, is a tadpole, a real fish—breathing by means of gills, and incapable of living out of the water. Subsequently undergoing a wonderful metamorphosis, and becoming a true reptile, cannot invalidate its fish-like youth; but only shews, that though a step higher in creation, it is very closely allied to the race below it.

It is strange, that even now, the sciences enlighten but a comparatively narrow horizon; and this seems the more extraordinary, as neither their utility, nor the amusement derived from their pursuit, can be questioned; and because in the earlier historic ages, we find traces of the cultivation of many of them. But there is a spirit of enquiry now abroad, which bids fair to wipe away the stigma from our own times.

The Ichthyology of the Ancients is sufficiently confused. That they had some knowledge of it, as well of other branches of Natural History cannot be denied; they even made collections. Alexander gave orders to all huntsmen, birdcatchers, *fishermen*, and others, to send whatever creatures they could procure to Aristotle. Apuleius, caused all kinds of animals—particularly *fish*—to be brought to him, that he might study their anatomy, and thus determine their characteristic peculiartiies.

It appears, indeed, highly probable, that the researches of the ancients, on this subject, were far more extensive than we can glean from the fragments of their works which have survived to our day; as from these, it is known, that fish was a more highly esteemed delicacy than either fowl or four-footed beast. Their culinary preparations are more frequently of fish than of other creatures. The fasting of the Greek monks was abstinence from what they considered the greatest of delicacies—fish; and if, at the present day, we go through the markets of Greece, we find a large preponderance of scales over feathers. Indeed, Strabo, Plutarch, and others, tell us of a people called Ichthyophagi (fish-eaters), who, although they possessed cattle, made no other use of them but to feed their fishes!

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Yet early as we find the taste for fish, and for their natural history, pervading the European world, and much as it has been cultivated of late, the history of one of the finest fish that swims—the salmon—is to this hour a matter of dispute.

In our British rivers we have, at least, fifty-four species of fish; of which number thirty-one, if not more, are found in this county.

Of the salmonidæ, we have three species—the salmon, the common trout, and the grayling; with, I believe, an occasional visit from two others—the sewin and the salmon trout. Of these, pre-eminence being universally accorded to the salmon, and in consequence of its commercial importance, and its hitherto disputed descent, a larger portion of this paper will be appropriated to that part of our present subject, than to any other.

A very remarkable feature disclosed by comparative anatomy, may here be mentioned; not only as in its connection with the gradual rise in the types of organized life, but as illustrated by Ichthyology; most, if not all creatures, in their embryo or early condition, pass through the gradations—perhaps they must be considered degradations—of inferior life. The whole of the fossil fish of the Devonian era (for previous to that geologists acknowledge but limited and obscure traces of this section of animate nature), are distinguished by the tail, formed of two branches of greatly unequal length. This one-sided sort of tail, is the characteristic of higher orders, at a certain point of their embryonic history. Such is the case with the salmon; which, as an embryo, possesses the tail, and also the mouth and vertebral column, of an inferior class.

By investigating the paternity of the fish, known by a great variety of local names, such as fingerling, graveling, parr, pink, and lastspring—we may be able to elucidate the perplexed history of the salmon.

One or two facts are puzzling enough to the unobserving and unscientific. It is known that the salmon fry go down to the sea every spring; yet, at all seasons this fish is in the river. Hence it has been denied, as it is found all the year in the river, that it can be same species as that which abandons the freshwater in the spring. Nor could it be, if the salmon fry really left the river soon after it was hatched—a belief which formerly prevailed—because in that case, all would disappear together. But since they are now proved to remain nearly two years in the fresh water before they seek the sea, it is obvious there must be these fish in the river the whole of every year. Those which have arrived at the age destined by nature for migration, accordingly migrate; the rest remain in their native stream, awaiting the appointed time; and so on, in successional years.

The external appearance of others of the salmonidæ, when young, has sufficient resemblance to deceive many. The same dusky, transverse bars, mark their sides. But this is no perplexity to the naturalist. A family likeness in early youth is the common stamp of nature. The lion's whelp, and the young of the domestic cat, have alike the tiger's marks. Fawns, in their youthful days, are spotted; though, when adult, many kinds are perfectly plain. However closely

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outward forms may approximate, there is no instance, so far as I am aware, of a coincidence of formation in the osteology of different species of the same genus; and I may venture to affirm that organic structure is incontrovertible evidence. Determine the anatomy of the salmon, and when a small fish of the migratory salmonidæ is found, having corresponding anatomy, that fish may fearlessly claim heirship to the salmon. The parr has sixty vertebræ, and the salmon is the only one of the salmonidæ having the same number. He must be a daring naturalist, therefore, who, in classifying these, should assign them the parentage of others of their genus. If a race of men were found having thirty-three vertebræ—which is one more than we have—what would it be? of the genus homo, certainly, but another species. In such rivers as the Teivi, where several migratory species of the salmon are found, those who know little of Ichthyology may easily be deceived in attempting to identify the different kinds. Let them visit your Herefordshire Wye, or the upper part of Bandon river, in the county of Cork, and they will have less to distract their attention; for the salmon is the only one of the migratory salmonidæ that regularly visits those waters. Whence then the multitudes of lastsprings in the Wye, and gravelings in the Bandon, if they be not young salmon? How comes the assertion that they are a distinct and separate species?

Since the laws stamped on nature, by the Creator, are inflexible, unswerving, and unerring, it results that a discovery in natural history, must, if true, be equally invariable and inflexible, and in harmony with the Creator's works, in that particular division of the great laboratory; else it is necessarily a misinterpretation of nature, If the fish of which we are speaking be a distinct species of of the salmonidæ, we are presented with that Ichthyological anomaly, "that monster which the world ne'er saw"—two species of the same genus, with precisely the same anatomical structure. Scientifically, therefore, it is at once pronounced not to be a separate species, or there would be some structural distinction. Besides, at nearly two years old, they have only attained a few inches in length; and, with rare exceptions, not three ounces in weight. In the whole range of nature, we meet with no instance in which this tardy growth is exhibited, where smallness is maturity. It is contrary to the law of nature. All creatures that have arrived at their full size and are yet small, have grown rapidly—a wise provision; for such are destined to a very brief existence; with which a protracted advance towards the perfect stage is inconsistent. The converse is equally true. The slow-growing races, whether of animate or inanimate nature, are comparatively large and of long life. The slowly matured oak, and the aloe, endure for centuries—the quickly-formed mushroom, for hours. The elephant continues to grow for nearly a quarter of a century—and lives long. The ephemera leaps perfect from his grub state—and dies in an hour, or at most, in a few days. Why then argue against nature's decree? Why stamp this little fish as an aberration of the Creative Power? Again, every fish in our waters can be detected breeding, if they do breed there. But though the parr has been watched and examined, with the most scrupulous care and industry, it is universally admitted "that its breeding is unknown." It has been noticed by all who have studied this part of

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the subject, that when the male parr has perfected his milt, the female presents only the rudiments of ova. Had they arrived at maturity—were they indeed a distinct species—both males and females must necessarily be complete in their organisation; the one, as well as the other, would show a corresponding breeding condition. No more appropriate instance of this need be desired than is shown in one of their own genus—the smallest of the migratory salmonidæ—the smelt. I have, at different times, examined considerable numbers of these little fish, and invariably found the milt and ova in an equally advanced stage in every specimen. When near the spawning time—toward the end of March—the milt of the male and the ova of the female are advanced, simultaneously, to that state when either can be made to flow by slight abdominal pressure with the fingers. Here we have a distinct species of the genus salmo, perfect, and scarcely larger than the parr, at his migratory stage; and were that parr an equally small, distinct, and perfect species, it is incredible to suppose that the male could breed and the female could not; that in short, the history of its breeding should be altogether unknown. Every experiment, too, has invariably ended in proving the parr to be the young of the salmon. Those now extensively carried on by the two Frenchmen, Gehin and Remy. but confirm the experiments of Shaw and others. The French Government has had the wisdom and patriotism to grant a sum of 30,000 francs to these two men for an extensive artificial production of fish; for the joint purposes of scientific objects, and an increase of the national resources.

In a scientific point of view, as well as in political economy, the breeding of fish is of some importance; and as many may not be aware of the facility of producing fish, by manipulation, and of the enormous quantities to be so produced, I may be allowed an observation or two on these points.

Perhaps I ought, for a moment, to advert to the singular assertion of Dr. Robertson, of Dunkeld, namely, that he had produced trout, through the agency of the female only—I mean, by extracting the roe from the female, without subsequent fecundation—that it had vivified. If this be true, previous impregnation must have taken place; which is Dr. Robertson's theory. How comes it, then, that the milt of the male, and the ova of the female, disappear at precisely the same time? If impregnation had occurred before the female's deposit, the male would be void, or nearly so, of milt, at a period prior to such deposit; which is contradicted by the unanimous testimony of numberless observations. The milt is not only a secretion of gradual progress, but is imperfect, until the cavity in which it forms is entirely filled. This great accumulation suddenly disappears—completely and at once. Is it credible to suppose that intromission produces this? Eminent anatomists have, from careful examinations, come to the conclusion that, as in the case of the frog, the organization of the fish is such as to render impregnation, *in utero*, impossible. My own testimony must be of little value; yet from the trifling practical knowledge I possess, I believe impregnation *in utero* physically impracticable. If Dr. Robertson's theory be correct, it seems to me, that nature has formed a superfluity in the excessive quantity of milt; a quantity easily accounted for, and necessary, on the supposition of *extra uterine* impregna-

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tion; the diffusion, in such an element as water, requires a proportionately large amount of milt, to ensure its contact with the bulk of ova.

The artificial production of fish is exceedingly simple. By causing the spawn to flow from the female into a vessel of water, and then the milt of the male into the same vessel; and by immediately stirring up the water, the ova are fecundated. That fecundation has been effectual can be known instantly; for, before the milt and ova have been mixed, the latter are of a pale orange colour. After they have been subjected to the influence of the milt, they are suddenly changed from pale orange to brownish, and a minute black speck will be seen in the centre of each. Some few white looking eggs will be perceived among the rest, and these are barren.

Now if we consider the numbers thus produced, in comparison with those abandoned to the open river, we shall at once see the immense benefit this branch of science must bestow. Estimating the salmon--large and small—to yield an annual average of 10,000 eggs each female, and calculating—I believe with a considerable degree of correctness—that not more than one per cent. becomes a mature fish; 100 only is therefore the produce of 10,000 ova when left in a natural state.

The causes of this production of mere units from thousands are sufficiently obvious. In some cases a deposit of mud will accumulate over the spawn, and it will perish. The water-ousel hunts eagerly for his favourite food; and I have watched this bird searching and scratching a salmon bed, and devouring the spawn with the greatest avidity. When hatched, the trout, the pike, the eel, and the perch, all prey upon the defenceless delicacy. Then comes man—perhaps as great a destructive as all the others together. Taking these various causes for the paucity of mature fish, compared with the mass of ova, it is perfectly credible that not more than 100 result from 10,000 eggs.

Mark the difference of artificial production.

In 1852, Messrs. Gehin and Remy obtained from 3,000,000 of eggs 1,600,000 fish—more than the half, instead of the hundredth part; and, with sufficient care, I feel satisfied that scarcely ten per cent. would be lost; thus introducing an enormous mass of food into the country, at comparatively a very trifling outlay; a subject which certainly ought to engage the attention of the political economist and those having the means of improving our fisheries.

The most striking peculiarity of the salmon, and some few others, is the power they possess of living in either fresh or salt water; in fact, that an alteration is essential to the continuance of the species. The salmon, too, affords the remarkable example of the rapid growth of fish under certain circumstances. The salmon, which at one and a half years old weighs only from two to three ounces, goes down to the sea for the first time, and returns in about three months weighing from two to five pounds, and occasionally more.

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Their arrival in our rivers varies very greatly; which, I apprehend, depends much on the temperature of the water. This is strikingly exemplified in the Oikel and the Shin, in Sutherlandshire. The Shin joins the Oikel five miles from the entrance of the latter into the sea; it might, therefore, be presumed that the salmon which entered the Oikel in the spring, direct from the sea, would continue a straight forward and upward course. The chief body of them, however, turns up the Shin. The temperature of the Shin is higher than that of the Oikel; and they do not journey up this latter river till the advancing season has raised its temperature. Precisely the same thing occurs in the Esk and the Eden of Cumberland. Though emptying themselves into the same estuary, salmon enter the Eden many weeks earlier than the Esk—the Eden is the warmer stream. For a similar reason, salmon remain some time within tidal influence. The water there is two degrees warmer than either salt or fresh water separate; chemistry having proved that when two fluids of different densities come in contact, the temperature is elevated for a time, in proportion to the difference in their densities; and as this mixture is constantly occurring at the mouths of those rivers which run into the sea, salmon remain there, a shorter or longer time, according to the warmth or coldness of the pure fresh water.

The salmon-trout and the sewin are such rare visitants to this county, and their habits so closely resemble those of the salmon, that they only need incidental mention as Herefordshire fishes; indeed, of my own knowledge, I cannot vouch for either of them being entitled to the honour.

The most universally distributed of the salmonidæ, is the common trout (S. fario). There is no purely fresh water fish that varies more in appearance and quality. From the varieties of colour—deviations in the spots—and external differences of shape, a plurality of species has been frequently inferred. But it seems now to be well ascertained that we have only one single species in our rivers; and my own experience certainly confirms it. No matter how nature may clothe the skeleton of certain specimens, so long as the osteology remains unchanged, the species is unchanged. The apparent varieties are easily accounted for. The different strata through which the rivers flow must impregnate the water with their peculiar chemical properties, and thus affect both the appearance and the quality of their inhabitants. I have witnessed this in some trout, taken from holes whence peat had been extracted, and which had become filled with water. These fish were not only dark, but very dark—scarcely a lighter colour than the peat itself; while in the neighbouring river, from which they had, no doubt, been driven by floods, they were peculiarly bright and beautiful. The variety and quality of their food will also make a difference. Yet neither the food nor the water are to be exclusively charged with this; for the brightest fish, in the clearest stream, if he takes up his abode under a low bridge, or in a thickly sheltered situation, becomes much darker than his brethren who sport in more exposed positions. Hence it appears that light is essential to the brilliancy of fish, as well as of plants; and so is good condition, for we never see a bright coloured fish immediately after spawning—the only season when they become thin and poor. Circumstances, therefore, determine these variations, and not

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distinction of species. Even the gilleroo trout of Ireland, whose stomach is unlike that of any other of the salmonidæ (being thickened into a substance resembling the gizzard of a fowl), has still the fifty-six vertebræ of the common trout, and is clearly nothing else. It has been imagined, and with great probability, that the thickening and hardening of the stomach is an accommodation of nature to the peculiarity of the food, which is found to be, almost exclusively, small crustaceous animals; and we are too well satisfied of the adaptability of the animal frame to circumstances to consider this as anything very remarkable.

The largest common river trout of which I have ever heard was taken in a small stream branching from the Avon, at Salisbury, in 1822. Its weight was twenty-five pounds.

Deformities are not common among fishes. But there is one curious malformation in the trout—the upper jaw is much shortened, and very obtuse. There is a specimen of one, thus imperfect, in the Museum of the Zoological Society; and in 1852 the Rev. Mr. Hill caught one in the Wye, which he kindly gave to me. I intended it for the Museum of the Philosophical Institution of Hereford; but have never been able to recover it from the hands of the party who was to preserve it. As I have said already, that higher classes, in their earlier stage, pass through the forms of their inferiors; this shortened upper jaw of the trout is an example of an arrest in its progress to the perfect state, at a point which marks the completed organization of the lamprey—a grade preceding the bony fishes. What is always permanent in the lower animals, becomes occasionally so in the higher, and is then a deformity.

Though Ichthyological monstrosities are rare, the trout is by no means a solitary instance. The perch has been taken with the back greatly elevated, and the tail contorted. It is so found in some of the lakes of the North of Europe, as well as in Llyn Raithlyn, Merionethshire; and I once took one, thus deformed, in a small brook in Picardy. Another very remarkable malformation has been noticed in both the perch and the carp; a female roe on one side, and a male roe on the other side of the same fish.

The grayling is the only other of the salmon family which claims to be a Herefordshire fish; and considering its beautiful shape, the sport it affords, its excellence as an edible, and its best season being in the autumn and winter, when the rest of its genus are out of condition, it is extraordinary it should not be more widely disseminated. In the Monnow, for instance, where though trout are abundant, they are of poor quality, I imagine the grayling would flourish; for it delights in rivers with a gravelly bottom, and an alternation of gentle stream and pool—the smallness of all its fins, except the dorsal, depriving it of power to stem a heavy and rapid water.

The mouth of this fish is so formed—the upper lip projecting considerably beyond the lower—that in rising at insects it is compelled to turn on its back; yet with such celerity is this movement accomplished, that it formerly received the name of umber, from *umbra*, a shadow. With the exception of the salmon, I

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believe it is the only fish, which even when feeding on surface insects, always lies at the bottom of the water. The beautiful hues of the mackerel, when first taken, scarcely exceed those of "the flower of fishes," as St. Ambrose is said to have called the grayling. Its green, blue, copper, and golden shades, as seen in different lights, combined with the most symmetrical shape, establish it pre-eminent in beauty over all the fresh water fishes; and it is peculiarly grateful to the epicure, not less than to the sportsman.

The herring genus affords us two specimens—the twaite shad and the alice shad (clupeidæ). These fish were long considered the parents of the celebrated whitebait. Mr. Yarrell has satisfactorily disproved this, both from a comparison of their habits, and anatomically. There is a great distinction between these two species; the twaite shad has teeth, and several dark spots along the side behind the gill-covers; whereas the alice shad has no teeth, and only one spot on the side. The latter, too, is a good fish on the table, the twaite valueless. They enter our rivers in May, seeking fresh water for the purpose of depositing their spawn.

The next family I shall mention should, in point of numbers, if not of excellence, head the list of British fresh-water fishes—the carps (cyprinidæ). Of this genus, we have nineteen species in England; at least nine of which are found in this county. For the most part it is a toothless race—presuming the mouth to be the appropriate organ for teeth. Yet teeth they have—and strong ones too—but they are situated in the pharynx, the upper part of the gullet.

I believe it has never been distinctly ascertained whence this fish was first imported; but it is generally understood to have been from the southern parts of Europe. Ichthyologists give the name of cyprinus to this fish; probably from that designation having been bestowed by the ancients on a fish supposed to be identical with the carp. Cassiodorus is the oldest author who uses the word *carpa*. He lived in the sixth century; and where speaking of the most costly fish, which then appeared on the tables of princes, says, "among these is the carpa, which is produced in the Danube." It is probable, therefore, that we have to thank the Danube for its introduction into England. When that introduction took place does not seem quite clear. According to Anderson's "History of Commerce," they were first brought into England in 1514. But it is perfectly certain they were in this kingdom before 1486; for in that year was published, perhaps the only work on angling ever written by a lady, Dame Juliana Berner's "Book of St. Albans." She says, speaking of the carp, "It is a dayntious fyshe; but there ben but few in Englonde, and therefore I write the lesse of hym." She however observes, "he is an envyll fisshe to take, and there maye noe weke harnays hold hym."

The great carp countries now are Austria and Prussia. In the latter I have seen many specimens weighing from sixteen to eighteen pounds each. They thrive well here, but seldom attain the size just quoted. There is a painting of one, however, at Weston Hall, Staffordshire, which weighed nineteen and a half pounds. They are probably the most productive of fresh-water fishes; Bloch having, he says, found 600,000 eggs in a carp of nine pounds. Though still held

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in some estimation, they do not appear to be as highly prized by the moderns as by the ancients; if we are to believe Krunitz, Heliogabalus invented a fricasee of carp's tongues. Krunitz was, however, mistaken, the tongues were those of peacocks and nightingales. Bloch asserts they have no tongue. So does Aristotle. Athenæus says they have a tongue, but that it lies in the upper part of the mouth or palate. The fact is, the palate of the carp is a thick, soft substance, even now vulgarly called "carp's tongue"; and certainly it is the most dainty part of the fish.

Of the rest of this genus, with the exception of the tench, which resembles the common carp in its habits, it is composed of unimportant races. such as roach, dace, gudgeons, loaches, and minnows. The loach is nevertheless remarkable in the want of union in the two parietal bones at the upper part of the head—shewing a structural relation between fish and reptiles.

Of the true perches (percidæ) I am not aware that we have more than one in this county—the common perch. The ruffe, or pope, is abundant in many rivers, and may be found here, though I have not met with it. We have, however, the stickleback, which is of another family of this class.

The Wye is celebrated for the size and excellence of its perch. I have seen four, taken the same day in the salmon nets, weighing together sixteen pounds.

These fish were well known to the ancients, and described by Aristotle. It is curious that a word, derived from its Greek name, and closely resembling it in sound, should be its common appellation in many countries. Thus, its Greek name was perkè (περκη); its Roman, perca; its Italian is pergesa; its French, la perche; its Prussian, perscke; and its English, perch.

Fish will bear wonderful extremes of temperature without sustaining any apparent injury. In Bushman's "Introduction to the Study of Nature," we are told that perch have been frozen—transported in that state considerable distances—replaced in water near a fire and recovered. If fish can endure great cold, some genera can also bear great heat. According to Saussure, both fish and infusoria are found in the hot springs of Aise, in Savoy, at a temperature of 113° Fahrenheit. Desfontaines and Shaw observed several kinds of fish in the hot waters of Cafsa, in Barbary; temperature 86° Fahrenheit. (Many years ago I verified the fact of the existence of infusoria in the hot springs of Savoy; and a gentleman who was with me, pronounced them to be of the second order—the leucophora.)

If fish can, uninjured, sustain these violent extremes of temperature, not less can their eggs continue their vitality, under the most remarkable vicissitudes. The tanks of India are dried up during the hot season, and every fish, of course, destroyed; but soon after the commencement of the rainy season, the tanks are replenished, not only with water, but with fish. Though many fantastical reasons are assigned for so strange a phenomenon, the only rational explanation seems to be that the ova of the former season, remaining dormant during the drought, were hatched on the recurrence of water, though continuing dry for many months.

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Nature thus playing pioneer for our benefit (if we choose to avail ourselves of it) by shewing us that, as the impregnated ova may remain long productive, deprived of the element essential to after life, how easy is the transmission of spawn, even from remote countries; thus making the replenishment of our rivers, or the introduction into them of new kinds, a matter of great facility.

Perhaps the ugliest fish we have is the bullhead; but it is said to possess a trait which would redeem the very personification of the hideous—care for its young. Unlike other fishes, it certainly hovers about its spawn for a long time after having deposited it, as if reluctant to abandon it to the mercy of unknown enemies. It is found in most of our streams, but particularly abundant in the Monnow, Dwyr, and their small tributaries.

The six species of sticklebacks (gasterosteus) contribute three to this county. It is the smallest fish in our waters, and is chiefly remarkable as being the most pugnacious. Each species is furnished with spines on the back, varying in number. These they use, as cattle do their horns; and an adversary is not unfrequently killed by them.

Of the pike genus (esocidæ) we have only one species—the most voracious of fresh-water animals; around whose broad, obtuse muzzle, however, a glory has been thrown by Shakspeare; who paints the "dozen white lucies" (the heraldic name of the pike) as part of the armorial bearings of the immortal Justice Shallow.

The pike grows to a larger size than any of our pure river fishes. I have repeatedly seen them, from the neighbourhood of Neufchatel, in Switzerland, between 25 and 40 pounds. Gesner relates it as a fact, that "in 1497, a pike was taken at Hailburn, in Suabia, with a brass ring attached to it, stating it was put there in 1230; it was therefore 267 years old; its weight 350 pounds."

Whether this be fable or fact, certain it is that many of the races live to a great age, and attain a great size. Does not this go far towards showing what I have long been inclined to believe—namely, that fish continue to grow till they die? A fact, if it be one, well worthy of establishment; as affording good evidence, and elucidating the mystery, of the few diseases that afflict them; for it is the gradual decay, consequent on a cessation of growth, which forms a large item in the history of disease.

Although fish is more difficult of observation than land animals—which, at almost any time, and under a great diversity of circumstances, we have opportunities for studying—yet, I think, we may reasonably conclude that the diseases of fish are few. It is a rare occurrence to find one out of condition, except from spawning. If they suffered the deterioration of age—inevitably following completion of maturity—we should as inevitably meet with numerous specimens labouring under the signs indissolubly united to the stage when growth had long ceased. As far as I am aware, this is not the case. What then can we infer, but that they are exempt from the visible decline, inseparable from having passed the

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point of perfection; and, therefore, that they increase in size as long as they live? There are even proverbs in support of the healthiness of fish; and though it by no means follows that a common proverb must be true, there is usually some foundation for it. We say in England, "as sound as a roach," and the Italians, "è sano come il pésce"—as healthy as a fish.

It is said that a pike will swallow a fish half its own weight, and I have reason to believe this. But the stories told of his voracity from gorging a tailor's thimble to fastening on the lip of a cow while drinking at the river, are endless.

It is curious to note the different values placed on the same article by different generations. In the reign of Edward 1st pike were dearer than salmon, and ten times dearer than turbot. In Henry 8th's reign, a small one sold for more than a fat capon; and a large one for the price of two house lambs in February. In these degenerate days, I am afraid neither fishmonger nor butcher can be persuaded to give, the one, ten turbots for a pike, and the other, a couple of lambs. As taste is often subservient to fashion—and as the dear must, of course, be the fashionable—probably taste had no more to do with the reputation pike formerly enjoyed than it has for the modern preference of house lamb.

The quality of fish depends greatly on food. The pike of the Medway, at those seasons when feeding on smelts, are in the highest condition, and of remarkably fine flavour. Nor is this at all extraordinary. The honey, from bees which collect it from particular flowers, is peculiarly flavoured. The partridge which lives among heath, more nearly resembles the grouse than the partridge of other localities. And this is natural. Since food replenishes evaporation, it is clear that food must impregnate the substance with its own appropriate characteristics.

Of the sturgeons (accipenser) there is one—the common sturgeon (A. sturio), which pays an occasional visit to the Wye; and a personal struggle has several times ensued betwen fish and biped—not always to the glory of the latter—for they are known to reach more than four cwt. This is the largest fish that seeks fresh water for the purpose of spawning. In spite of its bulk, and alliance with the shark, it is perfectly harmless; and exhibits in its structure a very low degree of organization. Its skeleton is cartilaginous, and not bony; and the tail has one lobe much shorter than the other. Its flesh is tolerably good; and it is particularly valuable for the eggs, which are manufactured into caviare; and for its air-bladder, from which the finest isinglass is prepared.

The flat fishes (pleuronectidæ), furnish one member of their family to Herefordshire—the flounder. This is a very remarkable genus—whereas all other fishes swim on the belly, the flat fishes swim on their side. In the vertebrate kingdom it is unique on another account—its want of symmetry in the head; both eyes are placed on one side; and an animal, to be symmetrical, must possess the two sides counterparts of each other, supposing it to be vertically divided exactly in the middle.

Those who have been deceived by its changes into the belief that the parr was not the young salmon, and who have thought, from the many variations

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observable in trout, that there was a multiplication of species, might find some striking analogical reasons for a contrary opinion, in the natural history of the flounder. In this curious fish, one side is usually coloured, the other white. But we often find them coloured on both sides—white on both sides, with brown patches on the white—and even with their eyes and colour on the opposite side to which they are generally placed. These are far greater and more important deviations than we find in either salmon or trout; yet they are mere varieties of one species.

Of eels (muræna), we have three species in this county—the broad-nosed, the sharp-nosed, and the snig. Strictly speaking, they are fresh-water fishes; yet, whenever they have the opportunity, it is said they migrate to the sea. It has been suspected, however (and as far as my own observations extend, I think with truth), that a large majority of them, if not the whole, remain during winter in the estuaries. Of all our fishes, it is the most susceptible of cold; and as I remarked when speaking of salmon, the mixture of salt and fresh water is warmer than either unmixed. When, therefore, they reach the higher temperature, it is unlikely they should pass through it into a colder; particularly, as every-day experience shows us that the sea is neither necessary to their health or propagation. It has been said, too, that those eels which have the means of migrating, reascend the rivers to deposit their spawn. It is probable some may do so; but that great numbers of them spawn in the estuaries, or in the sea, if they penetrate as far, is certain. If not, whence come those multitudes of young eels whose periodical passage up the Thames is called eelfare? Whence the transit of those myriads of elvers up the Severn and its tributaries? Obviously the result of fish which have spawned *below*. Both these names, eelfare and elver, appear to have the same derivation; being compounded of eel and fare; the latter, a Saxon word, signifying to go, or travel; and it is still retained in our language, with its original meaning—for instance, in the words, "thorough*fare*," and "way*farer*."

That eels did spawn at all was long denied. They were considered viviparous; and the presence of a multitude of thread-like living creatures being found in them at certain seasons appeared to sanction the idea. These were not, however, the young eels; but one of the internal parasites, to which this fish is peculiarly obnoxious.

Some very odd notions have prevailed respecting the propagation of eels. Pliny says they are produced from bits, separated from the parent bodies by friction against rocks; thus degrading the fish to at least a level with the polypi. But Helmont favours us with a strange receipt for engendering eels, as can well be imagined. He tells us to "cut two turfs, covered with May-dew, and lay one upon the other, the grassy sides inward, and expose them to the heat of the sun. In a few hours there will spring forth a great quantity of eels."

Though many fables have been related of the eel travelling by land, it certainly can make its way for some distance; the singular arrangement of its gill-covering, by not exposing the gills themselves to the atmosphere, enables it to live for many hours out of its native element.

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A curious discovery of pulsation in the tail of the eel was made by Dr. Marshall Hall, in 1831. This pulsation is wholly unconnected with the heart, and beats more than double in the same time. Dr. Muller, Professor of Physiology at Bonn, found that these pulsating sacs in the batrachia—such as the frog, salamander, and others—contain lymph, and direct its motion. The pulsation in the eel is probably lymphatic.

The electric eel (Gymnotus electricus), not being one of our fishes, I merely allude to it, for the sake of noticing the singular fact that, so long ago as the days of Anthony and Cleopatra, their physician, Dioscorides, recommended, for medical purposes, the shock of the electric eel—the earliest record extant of the application of electricity to medicine.

The last fish to which I shall now refer is the lowest in this division of the animal kingdom—the lamprey (petromyzon). We have four species in England; three of which, if not the fourth, are found in the rivers of this county. Two of them (P. fluviabilis and P. plauerii) are often called lamperns; why, it were perhaps difficult to say, unless to puzzle Ichthyologists. They are true lampreys. By means of their circular fleshy lips they adhere firmly to stones or fish; piercing the strongest integuments of the latter and preying on their substance.

To those who have never examined this remarkable fish, it must seem utterly incomprehensible, how, when adhering closely to any object by means of the mouth, the process of respiration can be carried on. But like everything else in nature, it is modified in accordance to the circumstances in which it is placed. Most fish have free gills, which open to expel the water that has been taken in by the mouth. But the lamprey is constantly so situated as to make this process impossible; it is, therefore, supplied with a power of breathing by means of external orifices, through which the water is both inhaled and ejected—altogether independent of the mouth.

The marine lamprey is found in the Wye, as well as in the Severn, during summer. Like all sea fish that mount the rivers, its purpose is to spawn. This it does in pairs, while the smaller species congregate in large masses.

The common river lamprey was supposed to visit the sea. Mr. Yarrell says that his own observations lead to a contrary conclusion. I have myself seen it in the Wye early in February—long before the marine lamprey has left the salt water; and hence conceive that Mr. Yarrell is right. The pride is much smaller than the others; and though often called the mud lamprey, it is not a real lamprey; for as the mouth does not form a circle, it is incapable of adhering to stones or any other object.

Between those fish that swim near the surface—such as the trout, and those that live at the bottom, as the flounder, loach, and eel—there is a great and important distinction. The former have a higher standard of respiration, a lower degree of muscular irritability, a greater necessity, for oxygen, die almost as soon as taken out of the water, and whose flesh quickly decomposes. While such as

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frequent the bottom, have a low degree of respiration, great muscular irritability, less necessity for oxygen, live long out of water, and the flesh not so soon subject to decomposition. Thus is each peculiarly adapted to its general abiding place; for, I need scarcely say, it is a mere vulgar error to suppose that fishes breathe water. Their life is sustained by air as well as our own. The water taken in, either by the mouth, or by an apparatus fitted for the purpose, in passing through the filaments of the gills, imparts to these the oxygen of the air it contains; receiving carbon in return; precisely like any of what are popularly considered air-breathing animals. The water, in its passage through the gills, is not decomposed; but merely the oxygen extracted from the atmospheric air contained in the water. Deprive water of this air, and no fish can live in it. Now as—especially in cold weather—the ground fish are partially, and often wholly, buried in sand or mud, their low degree of respiration is perhaps necessary to existence; as in such a situation they must obtain a more limited supply of air, than in the free and open water; thus, not very remotely, approximating to the hybernating animals of earth.

I must close these slight remarks on the Ichthyology of Herefordshire, by adverting to one part of the economy of fishes, which remains unexplained—at least satisfactorily—the air-bladder. Its office is usually supposed to be that of enabling the fish to raise or depress itself in the water, at will, by a sudden and voluntary alteration of its own specific gravity. But this may reasonably be doubted; for at least one fourth of the race are without it. Were this large proportion condemned to crawl at the bottom, we might have better reason to believe the air-bladder necessary to empower the fish to rise. It is not so, however. The cartilaginous tribes are deprived of it; and we have a familiar instance in our two species of mackerel—both having bony skeletons; and both possessed of precisely similar habits;—yet the one has an air-bladder, and the other has not. If the air-bladder enable the animal to rise and sink, at pleasure, it is clear that the one without such organ, and which can yet perform the same office, must either have some compensating power, hitherto undetected, or the air-bladder is not necessary for the purpose to which it is commonly presumed applicable. No scrutiny has been able to discover any equivalent in those genera which have it not: and it would seem, at least, very anomalous, to be requisite in the progression of one and not of another, unless the structural difference were far more considerable than it is found to be, in many instances. Chemical analysis has proved that the air contained in these bladders is not atmospheric air; nor is it universally the same in all fishes—nitrogen being in excess in some species, and oxygen in others; which would lead to the deduction, that it was not a mere swimming apparatus; for they are filled with an animal fluid; and I am not aware that in any branch of physiology a natural secretion is elaborated, except in connexion with some vital function; which the simply moving upward, or downward, in the water, cannot be considered. We must, therefore, look for some faculty in those to whom has been granted this additional organ, which is not held in common with such as are deprived of it: for, in all animate nature, where the organism is varied, so I believe, are the demonstrations.

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For such reasons as these I am induced to conclude, with Dr. Priestley and the ancients, that the air-bladder in fishes is designed for other purposes than merely ascending, or descending, through the water.

The discovery of what these may be is still to be made.

NOTE.

P. 65.—"*However closely outward forms may approximate, there is no instance, as far as I am aware, of a coincidence of formation in the osteology of different species of the same genus.*"

When this paper was read at a Meeting of the Naturalists' Field Clubs of Herefordshire, Worcestershire, and Gloucestershire, the above position was denied; and the felidæ adduced in opposition to the text. I consider, however, that we can scarcely be justified in illustrating one great division of animate nature by another. The laws which govern the one may be totally different from those which influence the other. This must apply with the greatest force, when two classes of animals, so far removed in the scale of creation as fishes and terrestrial mammalia, are compared. I was speaking of Ichthyology, alone. Nevertheless, I think it will be found to apply, as a general rule, to every grade of animal life—the felidæ not excepted. The numerous species of the genus felis very closely approximate in their osteology: but even here, it is only approximation—not identity. Mr. Owen has shown a difference between the skull of the lion and the tiger, for instance. The structural distinction, however, between even the largest and the smallest of this genus—between the lion and the cat—is so trifling that Zoologists determine the various species by other than anatomical details. Still, I cannot but think—since the only permanent character is the skeleton—that wherever this principle is unrecognized, there must be perplexity. So closely are the felidæ anatomically allied, that Temminck considers them zoologically indivisible. But what Naturalist has ever so affirmed of any genus of fishes? However nearly external appearances may approach—as they do in some of the salmon species—I am bound to say that I am not aware of any instance in which structural difference does not mark species; and therefore conclude that anatomy is the true basis to distinguish them. Even were not this recognised by Naturalists, and an observer of fish noticed that there was a striking distinction between the anatomy of different species of the same genus, he would be startled to find, in the course of his researches, two so called species, in which there was no structural distinction; and would judge them to be misplaced. So would an observer of the feline tribes, on finding the anatomy of various species to shew very trifling differences, be surprised to detect, in two of them, a wide dissimilarity. I believe no instance of this has occurred: if ever it should, the supposed species would probably be removed from the genus to which it had hitherto been supposed to have belonged; and if not referable to any other, would either form a separate and new genus, or hold the isolated position of an anomalite.

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I must therefore conclude, that where there is a very marked difference between any two species, a similar marked difference will extend through every species of the genus; that where the difference is trifling between any two, such trifling difference will characterize the whole; and that there are no classes which will not come under one or other of these rules.

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, TUESDAY, JULY 26TH, 1853.

LEINTWARDINE, FOR DOWNTON, WIGMORE.

The Second Meeting of this Club was held on Tuesday, 26th July. At 5-30 a.m., notwithstanding the frequent and heavy rain which was then falling, a party of the Members started from Hereford in a brake supplied by Messrs. Bosley, and made their way to Leintwardine, which they reached at 9 a.m. Having partaken of an excellent breakfast at the Lion Inn, the Members transacted the business of the Club. The new members, Mr. Booker of Ross, and Mr. Stubbs of Fownhope, were unanimously elected. A letter from Dr. Rowan, of Hereford, was read, stating his inability to be present, and enclosing for the use of the Club a schedule of directions for taking meteorological observations, which he had received from James Glashier, Esq., of the Meteorological Society of London. By about 11 a.m. the rain began to clear off, and the Members started on their scientific explorations. The remainder of the day was fine, and the varied scenery which met their view at every step, whether the eye ranged over the broad vales and step-like ridges of South Shropshire, or surveyed the picturesque wooded hills and valleys of North Herefordshire and Radnorshire, showed to the greatest possible advantage.

Under the guidance of the respected President, the Rev. T. T. Lewis, they visited the limestone quarries, one mile from Leintwardine, on the Ludlow road, and then made their way through the beautiful demesne and woods of Downton, to Burrington and Leinthall. Thence they directed their course to Wigmore, after a most delightful and instructive ramble of about six hours duration. At 5 p.m., the Members met at the Hundred House Inn, where they refreshed their exhausted frames with an excellently served dinner.

There were present—The Rev. T. T. Lewis, President; Rev. J. B. James, of Knowbury; Rev. J. F. Crouch, Pembridge; Mr. E. Davies, Barrister of the Oxford Circuit; Mr. Lingwood, Mr. Cam, Mr. Purchas, Mr. Lichfield. Mr. Blashill, Mr. A. Thompson, Mr. Edmunds, and others.

After dinner, Mr. Lingwood read a Paper containing a list of the Birds of Herefordshire, as observed by himself and some friends upon whose accuracy he could rely. After spending a day of great intellectual enjoyment, the party separated about 9 p.m.

Throughout the day the Members were greatly indebted to the Rev. President for his lucid explanations of the arrangement of the various strata belonging to the Silurian system, which the party visited. Some excellent specimens of Pentamerus Knightii, various Trilobites, and other fossils were found.

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We subjoin a list of the rarer plants gathered in the course of this ramble of ten miles in length :—

ON ASCENDING THE HILL FROM LEINTWARDINE.

Erysimum cheiranthoides—Hedge mustard.
Galium montanum—Dwarf bedstraw.
Reseda luteola—Dyer's weed or Weld.
Trifolium medium—Trefoil.

AT DOWNTON-ON-THE-ROCK.

Lactuca muralis—Wall lettuce.
Tanacetum vulgare—Tansy.
Sambucus Ebulus—Danewort, or Dwarf elder.
Campanula Trachelium—Nettle-leaved Bell-flower.

IN DOWNTON GORGE WOOD.

Adoxa Moschatellina—Moschatel.
Hieracium murorum—wall Hawk-weed.
—— —— boreale.
Chrysosplenium oppositifolium—opposite-leaved Golden-saxifrage.
—— —— —— alternifolium—alternate leaved ditto.
Saxifraga granulata—white Meadow saxifrage.
Sedum Forsterianum—Forster's Orpine.
Luzula Forsteri—Forster's Wood-rush.
The numerous splendid oaks seen were chiefly Quercus sessiliflora.

FERNS.

Polypodium Dryopteris, Cystopteris fragilis, the Maiden-hair-fern, Blechnum boreale (Hard fern), besides the Common Polypody, the angular Shield-fern, the Hart's-tongue, &c. The ill-savoured Allium ursinum (wild Garlic) was abundant, and there were many beautiful lichens and mosses observed.

Asplenium adiantum nigrum.

AT BURRINGTON.

Artemisia Absinthium—Wormwood.
Chenopodium Bonus Henricus—Good King Henry.

IN WET PLACES.

Scrophularia Ehrharti—Square-stemmed Fig-wort.

IN CORN FIELDS.

Ranunculus hirsutus—Hairy Butter-cup.

IN MEADOWS.

Geranium pratense—Great Cranesbill.
Nasturtium terrestre—Land-cress.
Glyceria rigida—Little Wall-grass.

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IN VARIOUS PARTS.

Sinapis nigra—table Mustard.
Hypericum dubium—Imperforate St. John's wort.
——— perforatum—Perforate ditto.
——— humifusum—Creeping ditto.
——— pulchrum—Small upright ditto.
Genista tinctoria—Dyer's weed.
Picris hieracioides—Hawkweed-Ox-tongue.
Carduus nutans—Musk-thistle.
Lithospermum officinale—Gromwell.
——— flavum—yellow ditto.
Lysimachia Nummularia—Money-wort.
Epipactis latifolia—Broad-leaved Helleborine.
Carex flava—Yellow Carex.
——— muricata.
Sanguisorba officinalis—Great Burnet.
Melicia uniflora.
Solidago virga-aurea—Golden-rod.

NEAR WIGMORE. (SPARINGLY).

Hyoscyamus niger—Henbane.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, TUESDAY, AUGUST 23RD, 1853.

KINGTON, PRESTEIGN, STANNER ROCKS.

The Third Field Meeting of this very successful and flourishing Club was held on Tuesday, 23rd August, the district chosen being the Upper Ludlow Rock, Wenlock limestone, and Caradoc sandstone, developed in the triangular space between Kington, Presteign, and Stanner Rocks. The day was a brilliantly fine one, there was a good attendance of members, and the exceeding beauty not less than the scientific interest of the country, made the meeting altogether a most delightful one.

The Hereford party of members assembled at 6 a.m. at the Green Dragon Hotel, from which they speedily departed on a small coach appropriated to them, on their way to Kington. The sky was at first overcast, but it speedily cleared, and the charming succession of views, and especially the magnificent panorama from the Norton Canon and neighbouring hills along that route, were never seen to greater advantage.

At 9 a.m. the members assembled at breakfast at the Oxford Arms Hotel, Kington. After breakfast, the Chair was taken by the Rev. T. T. Lewis, the President, and the business of the Club was transacted. Mr. Edward Davies, of the Oxford Circuit, was unanimously elected an honorary member. Letters of apology for unavoidable absence were read from Professor Sedgwick, of Cambridge University, and other honorary members; and one from Francis Evelyn, Esq., kindly granting the members free permission to explore his grounds. Two gentlemen were nominated as candidates for membership, and will be balloted for at the next meeting, viz., the annual meeting in January, 1854. A communication from Mr. Purchas, who was prevented from being present, suggesting the supply of maps to the members in order that they might record their observations of the botany of the various districts, and thus aid the work of making out a complete Flora of the county, was read and discussed; but the question was finally postponed to the annual meeting.

About 11 a.m., the members started for Corton Gate, near Presteign, where they proposed to commence their explorations for the day. On arriving at the spot, the respected President (who throughout the day acted as the cicerone of the party, luminously explaining the phenomena of the district) led the party to the Nash Quarry, which is close to the toll-bar. The rock there laid bare, he

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explained, is a conglomerate of fragments of sandstones, quartz, and other rocks, deposited in the form of mud, and afterwards consolidated by great heat and pressure.

The hammers of the party were speedily in rapid action, but the rock presents little to repay the explorer; and the party, after a brief stay, bent their steps in the direction of the Folly, situated on the northern face of the hill. On reaching that spot, the striking beauty of the vale of Presteign, with its encircling range of hills, singularly varied in forms, and in many parts richly clad in foliage, with the old gray church tower, and the quiet town bathed in the brilliant sunlight, excited the admiration of the visitors.

In describing the geologic formations of the scene, the Rev. President remarked that the hills before them consist of the Upper Ludlow, but in one instance, a broad patch or islet of Old Red Sandstone, quite dissevered from all the rest of the formation, still forms the summit. This Old Red islet crowns the hill, called Hell-peak Hill. Its occurrence is interesting, as evidence of the natural sequence of the rocks.

Doubtless, the whole tract of country was once covered with the Old Red, but save the islet before them, and one or two others lying some miles to the W. and S.W. of that spot, the whole formation had been swept away, leaving the subjacent rocks exposed.

At this quarry the members found a great number of specimens of trilobites and other fossils, but had not time to prosecute their search to any great extent.

From that spot the party proceeded through the wood in a southerly direction, visiting various quarries and spots where the Caradoc sandstone "crops out," the botanists gathering a number of uncommon plants, and the geologists finding many interesting specimens of Orthis, Pentamerus, Corals, and other fossils. The next stage was the lofty precipice of Wenlock limestone, at the Nash lime kilns. From that spot they made their way again through the wood into the lane leading to Knill.

Passing on through the romantic gorge in which the secluded mansion of Knill Court is situated, the party proposed to extend their explorations to the lofty and striking igneous dyke of Stanner rocks, the concussion attending the protrusion of which (Mr. Lewis explained) had probably caused the wild contortions of the strata, now forming the picturesque hills of Burva, Herrick, Bradnor, &c.; but as a section of the party had previously devoted themselves to the botanical examination of Stanner rocks, and as the hour fixed for the not less important duty of dining was fast approaching, it was resolved to leave the geological exploration of Stanner to a future occasion. The members reconciled themselves to this decision the more readily since they felt at that time of the day, about 4 p.m., it was useless to attempt the satisfactory examination of a spot which would well repay the labour of at least an entire day, Having gratified themselves with many an admiring look at the beautiful scene, the party directed their course through the pass by way of Downfield, entering the Aberystwith road near the two-mile stone.

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In passing along, a road-side heap of water-worn, and other fragments of stone, attracted the attention of the President and the Rev. W. S. Symonds; and in it the President discovered (we believe in Downton limestone) a small slab, full of fine specimens of the Lingula, a fine Serpulites, &c.

At 5 p.m. the members assembled to dine at the Oxford Arms Hotel. The dinner was an excellent one in every respect, the Rev. T. T. Lewis occupied the chair, and there were present also the Rev. W. S. Symonds, Rev. R. Holmes, Rev. J. H. Barker, Rev. W. H. Thackwell, Mr. Edward Davies, Mr. Lingwood, Mr. E. H. Griffiths, Mr. Wheatley, Mr. Lingen, Mr. Cam, Dr. G. H. Marshall, Mr. Blakeley, Mr. Suter, Mr. W. Blashill, Junr., Mr. A. Thompson, Mr. Edmunds.

Upon the removal of the cloth, the Chairman gave the health of the Queen and the Royal Family, which was drunk with all due honour. The Chairman then observed that, as the members had mostly considerable distances to go in order to reach their homes, he would at once proceed to the business of the meeting. He would, therefore, at once call upon Mr. Flavell Edmunds to read a paper.

Mr. Edmunds rose and said that he had thrown together a few thoughts on a department of botany which he had felt to be a very interesting one; but he had done so, not because he felt that he could lay before the meeting much, if anything, that was particularly novel, but rather in the hope that he should thereby provoke a conversation, and that thus the members might be all benefited. He then proceeded to read the following paper on

COLOUR IN PLANTS: ITS CAUSES AND DISTRIBUTION.

By Flavell Edmunds.

The beauty of the vegetable kingdom, constituting as it does its most prominent characteristic, seems to have been designed by the great Artificer specially to attract the notice of man. Hence to the mind of the child, the beauty of a flower is an attraction as early as it is unfailing; and to the mass of mankind, who in the study of nature seldom pass beyond the portals, the child's love of flowers remains to the latest period of life. In the pageants and pomps which delight the multitude, no less than in the decorations of the great and wealthy, flowers still occupy the place of honour. The crown of the monarch, and the rustic's maypole; the ornaments of the bride, and the decorations of the coffin; the wreath of the conqueror, and the chaplet of the bard; alike owe their beauty to the use of the imitation of flowers. The vegetable kingdom supplies to oratory the finest illustrations; to poetry, its most beautiful imagery. When we come to analyse this universal feeling, we find it to consist in most cases of a mere perception of the hues which adorn vegetation. The soft green of the sward, the bright colours of the flowers, and the varying tints of the leaves, are caught by the least instructed eye. To the thoughtful enquirer it seems obvious that this

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universal perception of beauty was designed to lead to a closer study of its nature; yet, by the great majority, even the small advance to a perception of the beauty of form is never taken. To such an eye—

> The primrose, by the river's brim,
> A yellow primrose is to him;
> And it is nothing more.

The wonders of vegetable structure—the exquisite adaptation of means to ends—the beautiful regularity of action, and the exact harmony of arrangement, are matters into which few, even of the otherwise well-informed, ever trouble themselves to look. In this, as in many other things, "men" continue to be but "children of a larger growth." Although it must be conceded that colour is the least essential of all the attributes of vegetation, and has been to some extent neglected by botanical writers as comparatively unimportant, yet its prominence as a characteristic, and the readiness wherewith all appreciate it, would point it out as worthy of a more careful consideration. Its susceptibility to atmospheric and other influences does, indeed, render it so variable, that according to the canon of Linnæus, it cannot be safely made the basis of the nomenclature of plants—a canon, by the way, which that great master himself has in various instances broken—but that very variability may itself prove to be the result of definite laws, and therefore be another reason for careful study. On various grounds then, the causes and distribution of colour in plants may be pronounced not less worthy of examination than any other branch of vegetable physiology.

In thus writing, I must not be supposed as implying that I have found time or opportunity to investigate the subject; I merely wish to call to it the attention of others better qualified than myself to prosecute it; and my object at present is simply to enunciate its elementary principles.

Premising that, in this branch of study, black and white are numbered as colours, I may notice that the hues of the vegetable kingdom are arranged by botanists in the following departments:—

1. Water colour, hyalinus.
2. White.
3. Brown, fuscus.
4. Yellow, luteus, which is subdivided into flavus, straw-colour; fulvus, the colour of molten brass; and gilvus, or iron colour.
5. Red, subdivided into incarnatus, flesh-hued; and coccineus, scarlet.
6. Blue, cæruleus.
7. Green, viridis.
8. Purple, cæruleo-purpureus.
9. Lead or ash-colour, cinereus.
10. Black, subdivided into niger, dull black; and ater, jet black.

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These colours are found appropriated to different parts of the plant. For instance, water-colour is found chiefly in the filaments of stamens and the styles of pistils; white in the centres of the cups of crateriform, and malvaceous flowers, which are less exposed to the light; and in that part of the stem which is underground. Yellow is found chiefly in the anthers and stigmas, but frequently in the corolla. Blue and violet almost exclusively appear in the petals, while green, save in a few instances, such as the Mercurialis perennis (Dog's Mercury) and the Bryonia dioica (red-berried Bryony) is confined to the leaves and the calyx. Red is found most frequently in the corolla, but it appears often in the leaves when decaying; it also tinges seed-vessels and fruits. Black is found in the roots, seeds, and sometimes, as in the Vicia tribe, in the seed vessels when ripe, of which fact it is in such cases the evidence.

Whatever may be the hue, or the part to which it is usually appropriated, it is ascertained that the colour in plants is generally due to the presence of a substance called chromule, distinct from the sap, which is found in the form of minute grains in the cellular tissue. The common theory of its formation, as physiologists state it, is a chemical one. It is asserted that the carbonic acid gas, which has been absorbed by the plant, is decomposed in the cellular tissue, the oxygen being given off to the atmosphere, while the pure carbon is retained by the plant, and converted into colouring matter. The researches into human physiology exhibit a case in some degree similar, in the colouring matter of the hair, of the negro's skin, &c. In the plant, this process of manufacturing chromule goes on most actively under the influence of sunlight. That part of the stem of a grass, or of the leaf-stalk of an Arum, for example, which is hidden by the soil or the surrounding grass, is always white. By imitating this natural process, the gardener blanches celery, or quickens the hearting of celery or cabbage. Dry plants become succulent in darkness, owing to the imbibed moisture not being so readily carried off by evaporation; and, which is less easily explicable, acrid, and even poisonous plants, may be rendered innocuous by the same process of "blanching." This would seem to show that the constituent of chromule is not pure carbon, but varies somewhat according to the constituents of the plant in which it is formed.

This conjecture may, too, help to explain the great difficulty of the chemical theory, viz., the production of a green hue in the leaves, and of a variety of other colours in the flowers of the same plant. May it not be because there are not only individual elements in different species, but distinct secretions in different organs of the same plant, which chemically modify the chromule? This, of course, you will take as merely my conjecture.

The chronological changes of colour are explained satisfactorily. To quote the valuable little work of Messrs. Chambers on "Vegetable Physiology," "It is found that when the leaves first expand, and are of the brightest green, the grains of chromule are always surrounded by a thin film of gluten, the principal ingredient in which is nitrogen. In autumn, the gluten and carbon generally have both disappeared, particularly in plants which contain a notable amount of

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acid, the basis of which is oxygen. In proportion as the oxygen predominates, the leaves become red; hence the beautiful tints of red and crimson taken by the same leaves in autumn. When the carbon disappears without the nitrogen, the leaves become yellow. It has been observed that the leaves of plants always turn yellow, red, crimson, or violet, and never blue, and this corresponds with the above theory, as the carbon, which is dark, is carried out of the leaves by the descending sap, and its place partially supplied with oxygen. . . . The Lime and other trees which abound in mucilage or gluten, further corroborate this theory in having their decaying leaves yellow. . . . The colouring matter is not in the sap, which is either colourless, or faintly tinged with yellow; thus, while the stem consists chiefly of cellular tissue, it remains as green as the leaves."

To the remark as to the Lime-tree, I may add that the Acer campestre (Common Maple) in almost every hedgerow, furnishes a parallel in the changes of its leaves, which are further remarkable for the ruddy tint which they assume in spring.

The presence of iron, manganese, and other mineral substances, and the peculiar character of the soil, are also important elements in the production of colour. We have all seen, in the cultivation of garden flowers, the immense changes, not alone in colour, but in form and size, which are effected by the artificial alteration of the soil.

The main cause of colour, however, must be admitted to be solar light. Plants found in mines generally differ from their congeners of the same species in the absence, total or comparative, of the colours which mark those grown in the sunlight. The recorded exceptions to this rule are not numerous, and seem to be confined to some of the lower classes of vegetable existence, viz., mosses and algæ, with an occasional case of ferns. I do not remember reading any instance in which the plant belonged to the phanerogamous, or flowering division of the vegetable kingdom.

The colours of young flowers change by fixed laws, just as we see the hues of fruits or seed vessels alter as they approach maturity. It has been found that these changes may be all classified thus:—

1. Red changes into white, blue, or maroon. The Digitalis purpurea (Foxglove) commences with white flowers, which become red, deepening into purple, and then fading into white again. Under some circumstances the Anagallis arvensis (Pimpernel) sends forth blue instead of scarlet flowers, but that is an accidental change rather than a progressive one. The hue usually alters as it fades to a maroon. The bud of the Myosotis palustris (Water Forget-me-not) which is tipped with reddish purple, becomes white, and then blue as it expands; while the Convolvulus arvensis (Small Bind-weed) fades from flesh colour to white.

2. Blue passes into white. In the Polemonium (Greek Valerian) blue and white flowers will be found side by side upon plants produced by the spread of the same mother stock; but the change appears to be one of seminal variety,

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rather than of progressive change. The Aquilegia, Polygala vulgaris (Milkwort) and Scabiosa arvensis (Scabious), which last I have found of all shades from pink ranging through blue to a blueish white, may be taken as illustrations of the remark made about the Polemonium.

3. Yellow passes into white. This is the case with the Agrimonia Eupatoria (Agrimony), which fades from orange into a dingy white. The converse is the fact with the Primrose, which advances from a pale straw colour to an orange, and becomes brown as it fades.

4. The change from white into purple is illustrated by the change of the snow-white blossoms of the Oxalis Acetosella (wood-sorrel), which become purple as they fade; while the tips of the perianth of the Daisy sometimes become pink or purple as the flower opens. A parallel effect may be seen in the upper part of the bulb of the Turnip, which turns purple as the bulb increases in size.

5. In rare cases, red gives way to golden yellow; the buds of the fitly named Hypericum pulchrum, when near opening, are tipped with crimson, but the flower becomes all golden when expanded.

The distribution of colour is, beyond question, thermal, whether we consider its chronology or its geography. These two departments, indeed, fitly illustrate each other. As we advance towards the perpetual line of snow, we find the hues of vegetation fading into white, just as the Galanthus nivalis (Snow-drop) marks the snowy time of the year. There are some exceptions in each department—the "red snow," a minute crimson lichen of arctic regions, and the purple blossoms of the Daphne Mezereon, in February to wit—but the rule nevertheless holds. In the same manner, the temperate zone with its wealth of flowers of all shades of white, blue, yellow, and pink, deepening into red, is paralleled by "the flowery lap of May," from which a dower of beauty, yet all of the more delicate hues, is poured over hill and dale. The deep reds and purples of summer are in likewise paralleled by the gorgeous hues of tropical vegetation. As the purples of the foxglove, the willow herb, and the vetch (Vicia Cracca); the crimson of the Lychnis, and the deep blue of the Hyacinthus nonscriptus (harebell) fade away from our hedges and hill-sides, the reign of yellow flowers succeeds. As the eye wanders from the orange of the tall Verbascum Thapsus and V. nigrum (mulleins) to the beautiful straw coloured spikes of the Linaria vulgaris (toad-flax) the golden star clusters of the Senecio Jacobœa (ragwort), and the broad flat flowers of the Inula Helenium (elecampane), while the delicate yellow tint of the hawkweeds leads the eye to the cheerful-looking Chamomile, with its fringe of white around a yellow centre, we feel that autumn in the hedgerows is in keeping with autumn in the fields; and that the lusty maturity of the year is golden in aspect as in produce. Most compound flowers now flourish, and all of them that are now in bloom are yellow; the connexion of that hue with flowers of the natural order Compositæ being not the least curious fact of the whole. Through the dreary months of winter, some of the hawkweeds are to be found, their lemon-hued flowers keeping us company until January brings us the bright yellow of the dandelion, and the duller tint of the groundsel, to help us on until the bright spring completes the circle with

"The yellow cowslip, and the rathe primrose."

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The connexion of colour with temperature is naturally suggested by its distribution. It appears to be established that the temperature of flowers rises in proportion to the "warmth" as painters say, of the tone. On introducing the bulb of a thermometer, flowers of deep scarlet have been found to be two or three degrees above the temperature of the surrounding air, while blue and white flowers were as much below it.

In conclusion I may add, that colours have an intimate connexion with the taste of plants, and therefore their fitness for the use of man. Linnæus tells us that:—

"Yellow generally indicates a bitter taste, as in gentian, aloe, celandine, turmeric, and other yellow flowers. Red indicates an acrid or sour taste."

The strawberry, however, might be named as an exception. Linnæus proceeded to instance:—

"Cranberries, barberries, currants, raspberries, mulberries, cherries, the fruits of the rose, the sea buckthorn, and the service tree. Herbs which turn red towards the autumn have likewise a sour taste, as sorrel, wood-sorrel, and bloody dock. Green indicates a crude, alkaline taste, as in leaves and unripe fruits."

I may here remark that the delicious greengage and magnum bonum plums are certainly not liable to this depreciatory sentence. The great botanist goes on to say:—

"A pale colour denotes an insipid taste, as in endive, asparagus, and lettuce. White promises a sweet luscious taste, as in white currants, plums, sweet apples, &c."

These fruits, however, seem to come rather under the description of "hyaline,' or water-coloured, than that of positive white.

"Black," he proceeds to say, "indicates a harsh, nauseous, disagreeable taste, as in the berries of deadly night-shade, myrtle-leaved sumach, herb Christopher, and others, many of which are pernicious and deadly in their effects."

To this last description, two of our most common wild fruits certainly do not answer, true as it generally is. The blackberry (Rubus fruticosus) and the bilberry or whinberry (Vaccinium Myrtillus) are not only very wholesome, but their taste rather tends towards flatness and insipidity than towards harshness, while the fact that both fruits are universally favourites with children may be taken as a sufficient testimony that they are not "nauseous." It is nevertheless true that many poisonous fruits are black, and that most black fruits are injurious to the human frame.

The Chairman presented the thanks of the members to Mr. Edmunds for the very interesting paper which he had just read. (Applause).

In the conversation which ensued, Mr. Lingen observed that Mr. Edmunds had struck upon quite fresh ground, and he (Mr. Lingen) had felt greatly interested

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by the facts and arguments of the paper. The whole subject of the development of colour was a difficult one. There could be no doubt that it was greatly affected by light, but still there were so many facts which seemed to conflict with that view, that it was very difficult to say how far that explanation could be taken as a solution. Take, for instance, the case of a tulip. Under the microscope, the structure of the corolla was found to consist of a great number of cells, in the majority of which the matter contained is either white or hyaline, yet among them would be found a single cell of another colour, say red. The red cell would be wholly disconnected from any others of the same colour, yet it would produce a streak or a patch of colour. How it received that colour, and how it acted in the spread of it, were the great difficulties of the case.

The Chairman observed that perhaps the difficulty might be explained by the laws of optics. A very minute alteration in the shape of the vessel might cause such a difference in its power of refraction, as to produce a different colour.

Mr. Lingen rejoined that he had carefully examined the cells, but could not detect any difference in shape in the case where a different colour was visible. There could be no doubt, however, that the presence or absence of light greatly affected the colours both of animals and vegetables. The well-known cases of the carp caught in subterranean rivers were instances of this fact.

Mr. Wheatley remarked, as an illustration of the influence of light on the colour of animals, that a fish that was caught under a bridge would be found to be of a different colour from what it would have been had it been caught in the open stream.

Mr. Blakeley observed that a similar fact was noticed in reference to trout caught in a dark pool. When, for instance, a trout was caught in Hindwell pool, it was a dirty looking fish, disagreeable to an angler's eye; but if the same fish were thrown into an open stream, where there is plenty of light, it speedily changes, until it becomes as beautiful in its hues as any other trout.

Mr. Edmunds asked whether the fish would be equally healthy in the dark pool as in the river.

Mr. Blakeley replied that the fish appeared to be healthy while in the pool, but its flesh would certainly not be so wholesome for food, and therefore the fish could not be so healthy in the dark pool as in the open river.

Mr. Lingwood, reverting to the remark in the paper as to the influence of darkness in blanching plants, observed that it must be taken with some limitation, as he had often found white, or apparently blanched specimens, growing in light situations, side by side with darker specimens.

Mr. Edmunds observed that doubtless facts which were quoted as illustrations of a theory, might often be explained away on more accurate observation; but there were certainly many well-established instances of the etiolation of plants. He had felt much gratified by the discussion which had been produced, and

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hoped that other members would institute observations upon the subject for the benefit of the Club and science generally.

A proposition to admit ladies to one of the yearly Field Meetings of the Club was brought forward, but adjourned until the annual meeting.

At 8 p.m. the Members accepted the hospitable invitation of Dr. Marshall to partake of tea with him at his house. Having spent a pleasant hour with that gentleman and his family, the party broke up about 9 o'clock. The Hereford members immediately departed homeward, and reached the City about 11 p.m.

In the course of the day, the botanists of the party gathered many interesting plants, of which the following are the most uncommon :—

IN NASH WOODS.

Borago officinalis.
Solidago Virga-aurea.
Campanula Trachelium.
Campanula patula.
Tormentilla vulgaris.
Jasione montana.
Artemisia absinthium.
Artemisia vulgaris.
Vaccinium Myrtillus.

AT STANNER ROCKS.

Teesdalia nudicaulis.
Lychnis Viscaria.
Helianthemum vulgare.
Veronica spicata.
Erodium cicutarium.
Ornithopus perpusillus.
Sedum rupestre.
Sedum Rhodiola.
Thymus Acinos.
Allium vineale.
Scleranthus annuus.
Scleranthus perenne.
Trifolium arvense.
Trifolium medium.
Trifolium striatum.
Geranium sanguineum.
Geranium columbinum.

IN THE RIPPLE GORGE, ABOVE KINGTON

Epilobium angustifolium.

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Woolhope Naturalists' Field Club.

EXHIBITION OF WILD FLOWERS, PRIZES.

SEPTEMBER 6TH, 1853.

At the Horticultural Exhibition held 6th September, 1853, the collection of wild flowers was the most attractive part of the Exhibition. The Prizes (gold pencil cases given by the Members of the Woolhope Naturalists' Field Club) were well contested. The first prize collection contained the surprising number of 740 plants, all collected within the past seven months of this year, bore the motto, "Solus non Solitarius."

It was sent in by A. T. Wilmot, Esq., Surgeon, Ross. Although it contained some plants which might perhaps be more strictly classed as cottage-garden rather than wild flowers, yet the collection was remarkable for the botanical skill and judgment displayed in the choice and arrangement of the specimens, while the nomenclature was almost invariably correct.

The second prize was obtained by Mr. E. Davies, of this City, for a collection of not less than 532 plants. The pressing and arrangement of these plants were remarkable for neatness, and the nomenclature was very careful and correct. Both collections reflected very high credit upon the exhibitors.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING, TUESDAY, JANUARY 24TH, 1854.

The Annual Meeting was held on Tuesday, 24th January, at the house of the Hon. Secretary, J. A. F. Suter, Bye Street, in this city. The chair was occupied by the Rev. T. T. Lewis, Rector of Bridstow, president for the preceding year, 1853; and there were present the Rev. J. F. Crouch, Rev. J. H. Barker, Mr. Lee Warner, jun., Dr. Bull, Dr. Rowan, Mr. Cam, Mr. Flavell Edmunds, Mr. Blashill, jun., Mr. Ballard, Mr. A. Thompson, Mr. Otte, and the Hon. Secretary. Mr. Hewett Wheatley, of this city, and Mr. E. H. Griffiths, of the Weir, were unanimously elected members. One candidate was nominated to be balloted for at the next meeting.

The president delivered an exceedingly interesting report of the Geological proceedings of the Club, at the various field meetings during the past year, in which he alluded in very feeling terms to the heavy loss which the club had sustained in the death, first of its founder and first Secretary (the late Mr. M. J. Scobie), and then of the late Mr. Hugh Strickland, one of its most distinguished honorary members. At the conclusion of the address, which was applauded, Dr. Bull moved, and Mr. Suter seconded, the thanks of the meeting to the President for his able and instructive address, with a request that he would allow it to be printed as the commencement of a record of the Club's Transactions. The motion was carried unanimously, and the President kindly acceded to the request.

After some conversation, it was resolved that prizes for the best collection of dried specimens of the plants of Herefordshire be given this year, as in 1853, but that they may be given from the funds of the Club, and not merely as last year under its patronage, and that the districts immediately around Hereford and Ross be excluded from the competition. The prizes will thus be offered for Herbaria, comprising only plants from the remainder of the county, beyond a circuit of eight miles around this city and Ross respectively. Dr. Bull observed that on consultation with Mr. Purchas, to whom the duty of drawing a conplete list of Herefordshire plants was entrusted at the Eastnor meeting, they found that the number of specimens sent in, during the past year, was so great as to approach within some 30 or 40 of all that could possibly be found in the two districts of Hereford and Ross; and they were anxious to see the other districts of the county equally well examined. He was happy to say that Mr. Purchas was making great progress with the complete list of Herefordshire plants upon which he was engaged. The members present then proceeded with the election of officers for the ensuing year.

The Hon. Secretary proposed, and the Rev. J. H. Barker seconded, that the Rev. W. S. Symonds, Rector of Pendock, to whose great attainments as a Geologist reference was made, be appointed President for the ensuing year. The

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motion was carried amid much applause, the ex-President expressing the great gratification which he felt at yielding up the chair to a gentleman so able to render valuable service to the Club, and so zealous in pursuit of science.

The Rev. J. F. Crouch then proposed, and Dr. Bull seconded, a vote of thanks to the Rev. T. T. Lewis for his very efficient services as President during the past year, and for his great kindness in imparting valuable information to the members at the field meetings. The vote was carried by acclamation, and was suitably acknowledged. Thanks were also voted to the Hon. Secretary, who was re-elected.

The Secretary subsequently read a statement of the income and expenditure of the Club, from which it appeared that there are 37 members, and there is a balance in hand of £15.

The subject of the admission of ladies to one of the field meetings annually was brought forward by the Secretary, but it was thought advisable to defer it for future consideration.

The three field meetings for the year were fixed to be held:—the first at the Speech-house in Dean Forest, the joint meeting of the Woolhope, Malvern, and Cotteswold Clubs, the day for which is to be fixed by the three Presidents; the second at Monmouth Cap, on Tuesday the 18th of July; and the third at Woolhope, on the 22nd of September. The meeting then terminated.

ADDRESS.

By the Rev. Thos. T. Lewis, M.A. President.

Gentlemen,

On quitting the office of President of the Woolhope Naturalists' Field Club, to which your kindness elected me last year, it devolves upon me, in conformity with your rules, to submit to you a brief sketch of the year's proceedings.

On entering this task the thoughts of all present will be at once directed to the painful events by which a wise providence within a few months deprived us of the society of two of our most active and valuable members,—the one regarded by us as the founder of our little club, and the other as a very distinguished member of it,—under circumstances awfully sudden, and too distressing and well known to you for me to dwell upon. Suffice it to say, that we are daily and hourly sensible of the loss we have sustained in their removal, but console ourselves in the retrospect, that they were not more respected by all who had the pleasure of their acquaintance and friendship, than distinguished for their abilities and intellectual attainments, their high moral integrity, and the zeal with which they devoted themselves to the promotion of science, and its application to the improvement of the condition of their fellow-creatures. Such ornaments of society ought not to pass away from this transitory scene as mere ordinary mortals. Among the friends of Mr. Scobie a desire was at once expressed to secure, if possible, a memorial

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of his personal appearance; and this has happily been affected by Mr. Butler, with a fidelity which is highly satisfactory to his nearest and dearest friends and connexions; and I have much pleasure in hearing that a mould of the bust is or will be prepared, which will enable such of his friends as are desirous to possess a copy.

With the members of the Cotteswold and Malvern Clubs, whose districts have been illustrated by the botanical and geological researches of Mr. Hugh Strickland, and where he had long been known and valued, a subscription originated to place a window to his memory in his parish church of Deerhurst. I heartily call your attention to this laudable design, and shall be happy to communicate to Mr. Symonds—whose absence on this occasion I much regret—any contributions from our members towards this object.

I now pass to the business of our present meeting, so far as your retiring President is concerned.

The financial statement I will but briefly refer to. A laxity in the payment of the yearly subscriptions has already commenced, to which it is proper your attention should be at once called, with the view of preventing its recurrence. Little or no expense, beyond that of printing the yearly statement, has been incurred, so that no inconvenience has yet arisen; all that need be said, therefore, is, that it is suggested that in future a statement of the year's receipts and expenditure be printed with the annual papers, and to request members to bear in mind that their subscriptions are due at the commencement of each year.

Though the last year has been productive of but few papers by our members, I may venture to say, the object for which the Club was formed, namely, the practical study of the Natural History of Herefordshire, has been strictly kept in view.

Four papers have been brought before our meetings:—

1. An elaborate paper, by Mr. Hewett Wheatley, on the Fishes of the Herefordshire Waters, from the perusal of which no one at all acquainted with the subject can arise, without feeling convinced of the superior scientific attainments and practical knowledge of its author on a very curious and interesting enquiry.

2. We were favoured by Mr. Symonds with a notice of lias and oolite fossils, found in the gravel near Cradley (west of the Malvern Hills) and his speculations on these facts; which, trifling as they may appear, are of great importance; affording real data in the discussion of questions, now of increasing interest, on the distribution of land and water, in times comparatively recent in the physical history of the earth.*

* In the discussion which arose on this paper, I stated that many years ago a Gryphæa incurva, very little worn, was brought to me by a person who assured me he had taken it from the gravel at Aymestry (perhaps 400 feet above the level of the sea), and that I had another specimen, much worn, which was taken from the gravel of the Wye, in the Oak Meadow, opposite to Ross. I quite believe these specimens were found in the localities above stated, and am confirmed in this opinion by a statement made by Mr. Lingwood at our last meeting that he had found the Gryphæa in the gravel near Much Dewchurch.—Aug., 1854.

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3. A more enlarged list of birds of Herefordshire than any yet published, was afforded by Mr. Lingwood, which we may hope ere long to have recorded in our pages; and

4.—An ingenious paper by Mr. Flavell Edmunds, on the distribution and causes of Colour in Plants, which has already been placed within the reach of the general reader.

Considerable progress has been made by our botanical members towards completing the Flora of Herefordshire. The approximate number of species is regarded by them a little short of 800. Of these, 723 flowering plants and ferns have been met with in our excursions, exclusive of such as have been regarded as doubtful, or escapes from cultivation, which have also with their habitats been carefully noted and excluded from the lists. The old catalogues of Duncomb and others (Agricultural Survey of Herefordshire) give the names of some plants which have not been met with; some of these may yet be discovered, whilst others, it may fairly be presumed, from the known distribution of British plants, will be looked for in vain within our area. We record with pleasure that several of the rarer species have been brought to light by the Herbarium Prizes offered by the Club, at the Hereford Floral Meetings of the past year, which, under certain conditions, we propose continuing the ensuing year.

In the formation of a Flora, it is not a mere catalogue of plants which the club has in view, but their distribution, as affected by soil, moisture, temperature, aspect and elevation above the sea; a design in which we have, I believe, the co-operation of the Cotteswold and Malvern Clubs, for their respective districts.

With this subject that of Meteorology is intimately connected. It is well known that considerable attention has been given to the ranges of the barometer and thermometer for many years, by many persons, in different parts of Herefordshire. The late Mr. Prendergrass' observations extended over a continuous period exceeding 30 years. Unfortunately his instruments were, as those of many others of the time, imperfect, and his observations not up to the requirements of modern science. Within the last few years very considerable improvements have been made in meteorological instruments, and methods of observation and correction much improved and facilitated. Under the direction of the Meteorological Society of London uniform and contemporary observations are being organized in very distant parts of the world. In this then, the very infancy of the subject, it has been proposed to our Club to purchase a set of improved instruments, which, if resolved on, Mr. Wheatley has kindly engaged to take charge of; and from his habits of accurate research, we may confidently look forward to a most faithful, interesting, and useful record of his observations.*

* A Barometer by Barrow.—Wet and dry bulb Thermometers,—maximum and minimum Thermometers,—Day and night Thermometers for solar and terrestrial radiation; rain gauge and wind gauge by Negretti and Zambra, Hatton Garden, London, compared with the standard instruments by James Glaisher, Esq., F.R.S., Secretary to the Meteorological Society, have been obtained and placed in the care of Hewett Wheatley, Esq., of Eign House. His observations are now forwarded monthly to Mr. Glaisher. The first three months are recorded, as on next page, in the Meteorological Tables, published in the Registrar-General's Report, for the quarter ending 30th June, 1855.

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The excursions of the year have been very fairly attended, and been productive of much social pleasure and improvement to those who had the privilege of taking part in them. Eastnor, Leintwardine and Kington were selected, as affording points of great interest in their respective neighbourhoods, which have been visited by several distinguished naturalists, who, since the year 1831, have contributed so much to the illustration of the natural history of our district, and given it an importance, not merely local, but cosmical.

The Eastnor meeting afforded us the gratification of the first joint meeting with the members of the Cotteswold and Malvern Clubs, and together with the enjoyment of the most exquisite scenery, upon a most charming day, the opportunity of associating and forming friendships with many already engaged in the same exhilarating and ennobling pursuit—the promotion of science and truth. You will, with peculiar and melancholy pleasure, recollect, that on that occasion, you had the high privilege, under the direction of our lamented friend Mr. Strickland, to examine the structure of the south-western portion of the Malvern Hills and Eastnor Park, and were deeply interested and instructed by the lecture with which he then favoured us; in which he communicated those views of the changes of surface, which modern science all but demonstrates must have taken place, since the deposition of the sedimentary strata which flank that range on the western side; announcements which must have been regarded not less astounding than novel, especially by those amongst us, whose minds had not been pre-engaged by objects of geological research, and disciplined and inured by the spirit of inductive philosophy. The centre of the Malvern chain was described as igneous; the successive sedimentary deposits, commencing with the equivalents of the lower Silurian rocks of Sir Roderick Murchison, and continued to the Old Red Sandstone, were enumerated. The effects of *upheaval* and *denudation* on the *harder and softer* strata, producing the domes, ridges and valleys which make up the more remarkable features of the nearer landscape from Malvern to Ledbury, Woolhope, Cradley and Abberley pointed out; the conditions assigned, under which the sedimentary rocks, in many places mineralogically unaltered, were deposited, upon beds of igneous matter already cooled down, in the bottom and along the shore of an ancient sea,—their elevated, inclined, and in some, not unfrequent cases, overturned position, in which they now remain, attributed

Name of Station	Eign
Height of cistern of the Barometer above the level of the sea	250 ft.
Mean pressure of dry air reduced to the level of the sea	29·689 in.
Mean temperature of the air	49°4
Highest reading of the Thermometer	85·6
Lowest reading of the Thermometer	21·5
Mean daily range of temperature	22·6
Mean monthly range of temperature	53·7
Range of temperature in the quarter	64·1
Mean temperature of evaporation	47·0
Mean temperatnre of the Dew point	44·1
Mean estimated strength of the wind	0·1
General direction of the wind	N.W. & N.E.
Mean amount of cloud	6·5
Number of days on which rain fell	37
Amount collected	5·4 in.
Mean weight of vapour in a cubic foot of air	3·6 grs.
Mean additional weight required to saturate a cubic foot of air	0·6 grs.
Mean degree of humidity	83
Mean whole amount of water in a vertical column of atmosphere	4·3 in.
Mean weight of a cubic foot of air	536 grs.

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to ebullition and efforts to rise of rocks in a state of fusion far below, and which found a vent here and there along the range and amid strata of more recent origin many miles distant. These changes were attributed to forces, producing not merely the upheaval of the range itself, but also the great fault which has been satisfactorily traced from the British to the Irish Channel, elevating the greater part of Wales from the level of cotemporary strata, which lie underneath the New Red Sandstone on the Worcestershire side of the Malvern Hills, and other formations more recent still, of the eastern parts of England.

We are not to imagine that no changes of surface have taken place since this great catastrophe; the uplifted and denuded strata of Herefordshire and South Wales afford ample evidence of the extent of denudation, and data to reason out their restoration, which gives as a result mountains of Old Red Sandstone now washed away, in comparison with which the greatest height of any portion of the existing deposit in South Wales is a mere fraction. This upward movement and denudation were inferred to have taken place, for reasons assigned, just before the period of the deposit which covered up the coal fields. It is quite foreign to my purpose, on this occasion, to go further into the evidence of this vast and interesting question, but I will confidently say, it is not built upon a mere idle fancy, but the result of an accurate investigation of facts, now recorded and reasoned out, with great patience of research. They who are anxious to follow up the train of thought springing up now perhaps for the first time in their minds, will find ample materials already prepared, the true value of which may be verified by a very few days' field work, in the paper of Mr. Horner, in the first volume of the Geological Transactions of London, 1811; Sir Roderick Murchison's Silurian System, 1838; Sir Henry de la Beche's paper on the formation of the rocks of South Wales and south-western England; Mr. Ramsay's paper on the denudation of South Wales, and the adjacent counties of England; and Professor Phillips's elaborate paper on the Malvern Hills: all to be found in the Memorials of the Geological Survey of Great Britain, vol. 1, 1846, vol. 2, 1848; and a paper by the lamented Hugh E. Strickland, on the elevatory forces which raised the Malvern Hills, in the Philosophical Magazine for November, 1851. I will only add, that, looking to the existing evidences of adequate forces, it may be fairly conjectured that the outburst of basalt which forms the top of the Clee Hills, in Shropshire, between 20 and 30 miles distant (20° N. of W.), and which there has not merely dislocated the coal field, and the elevated portions of it, 200 or 300 feet above the level of the top of the Malvern Hills, to a higher position than that of any other coal field in Britain (?), carrying up the three lower seams of coal in one place many yards above the corresponding strata on each side of the fault (the upper seam being now wanted), and overflowing them like the top of a huge mushroom, was obviously due to that period, and might not improbably have been connected with the convulsive throes to which the elevation of the Malvern Hills, and the continuation of the range to Abberley, and of the Old Red Sandstone of Herefordshire may be attributed.

Before passing to the Leintwardine meeting, with a view. of giving the matter a little more continuity, I will recall your thoughts to the last meeting of 1852,

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which took place at Mortimer's Cross, of which, in the absence of the President, I had the honour to have the direction. The object of it was to familiarize the eye with the best types of the Upper Ludlow formation, which, rising from below the Old Red Sandstone of Herefordshire, forms the top of the Silurian system. Commencing our walk at the North-field quarry, in the parish of Shobdon (the equivalent of the Downton Castle building stone), we visited several sections and quarries along the slopes towards Croft Castle, observing the junction of the yellow sandstone beds, with the Old Red Sandstone near Lucton, and following down the strata to the limestone in Croft Castle demesne valley (the equivalent of the Aymestry and Sedgley limestone, separating the upper from the lower Ludlow rocks), which we examined on each side of the valley, and again at the Whiteway Head (on the prolongation of the escarpment from Aymestry and Croft Ambrey), where the strata are highly inclined, and the structure well exhibited. (See the beautiful wood-cut page 243 of the Silurian System). Occasion was taken to explain the meaning of the strike or direction, and the dip of rocks; the use and measure of the same; anti-clinal and syn-clinal lines of action: the formation of domes, basins, valleys of elevation, and denudation; the actual thickness of strata, in relation both to the horizontal and vertical lines drawn through them;* deceptive appearances of frequent occurrence pointed out, arising from faults, repeated strata, and strata rolled over. Remarks were made on the sedimentary and mineral structure of rocks, the creation of organic beings, their duration and extinction, and the importance of their imbedded remains in the identification of contemporary deposits. Several of the most remarkable fossils were collected. I need not trouble you with their well-known names. It is an advantage of our field days, that they must send us to our books; whereas, owing to the *vis inertiæ* of our nature, the persual of the very best books on the subject will not necessarily send us into the field: for this reason, most strictly one of bodily and mental enjoyment, such clubs as ours are worthy of all encouragement. Our walk was continued over Croft Ambrey and along the escarpment of Yatton Hill, which affords most extensive and instructive views of the Old Red Sandstone and Silurian districts, from the Cambrian ranges of North Wales, beyond the Corndon and Stiper Stones to the basaltic top of the Clee Hills, Abberley, The Lickey, Malvern, Woolhope, May Hill, The Cotteswold, Forest of Dean, and South Wales. A grand physical feature, hereafter alluded to, the repetition of the upper Silurian rocks, exterior of the south side of the Wigmore valley of elevation, in a great bow, commencing near Aymestry, and extending to the Ambrey and the Palmer's Cairn, in the parish of Orleton, was pointed out. In our descent to Aymestry we took the path of an old road, up which I had the honour of conducting Mr. Murchison (now Sir Roderick), in his first visit to Herefordshire, July, 1831, presenting in itself a continuous section from the Lower Ludlow rock to the Old Red Sandstone. I had at this time very fairly developed the structure of the surrounding country. My own researches in this district commenced with my residence, at Aymestry, in 1827: but I was working

* The thickness of any stratum in relation to a horizontal line drawn through it, is—that line multiplied by the natural sine of the angle of inclination of stratum; and in reference to a vertical line, is--the vertical line multiplied by the natural co-sine of the same angle of inclination.

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in the dark, and it was in that walk, which I continue to regard as one of the most interesting events of my life, there dawned upon me the vision of the deep interest of the then comparatively unknown country, in which it was my good fortune and happiness to be dwelling, and to the true development of which I had, unknowingly, discovered the key, and made some progress. With what zeal, industry, ability and success Sir Roderick Murchison has followed up these beginnings, and prosecuted the identification of these rocks, through our own and the adjoining counties, and the greater part of the North of Europe, into Asiatic Russia, is shown by his great works on the Silurian System (1838), and the Geology of Russia and the Ural Mountains (1845), and the various scientific journals of the time; and how far it has been verified by the researches of others, more especially by the United States' naturalists, will be seen in their own reports, and Sir Charles Lyell's interesting volumes on his two visits to that country. We shall have a condensed view of the known distribution of these rocks over the Globe, by Sir Roderick Murchison, in his new work "Siluria," now announced.* The history of the Silurian system must be sought in the proceedings of the Geological Society of London, the anniversary speeches of its Presidents, and in an article by Dr. Fitton, in the Edinburgh Review, April, 1841.

The Leintwardine meeting afforded us an excellent opportunity in the section along the new road to Ludlow, for examining the lower Ludlow rocks, between the Aymestry and Wenlock (= Sedgley and Dudley) limestones; and passing through the Aymestry limestone, we came upon the upper Ludlow rocks, which we found again succeeded by the Aymestry limestone at Downton, and on both sides of the river Teme, near the Bow Bridge. Continuing thence along the Downton Castle walks, in the gorge of the river, through the upper Ludlow rocks, we arrived at their junction with the yellow micaceous sandstone (known as Downton Castle building stone), near the Castle bridge; noticing here† the hitherto discovered northern limit of the Silurian fish-bed, the exact position of which was pointed out, and fragments of it collected. Our section proceeding now in a descending order, again we passed the upper limestone on the ridge of the Ludlow promontory, here forming the northern side of the Wigmore valley of elevation, over the obscured escarpment to the thinned-out strata of the Wenlock (= Dudley and Ledbury) limestone, to the productive organic shales (known as Wenlock Shales) at Burrington. The

* Published May, 1854, of which a new edition is now preparing. The reader will do well to consult the reviews of this work, in the *North British Review* and *Quarterly Review*, October, 1854.

† My friend, the late Dr. Thomas Lloyd, of Ludlow, in 1832 first noticed the existence of fossils in the Old Red Sandstone of Herefordshire about the Wyld, near Leominster, and soon afterwards near Downton Hall and other places in the neighbourhood of Ludlow. Onchus Murchisoni was discovered by myself in the mudstones of the upper Ludlow, near Batchcott, 1833, and Pterygotus problematicus in the exact equivalent, near Croft Castle, in 1835. The Ludlow bone bed was laid open 1834, by workmen engaged in a quarry—now filled up—on the site of the house at the entrance to Ludford churchyard from the bridge. Its position is near the bottom of the yellow sandstone, known as Downton Castle building stone; a repetition of the bed, vertically separated several feet, was observed by the late Messrs. Scobie and Strickland, at Hagley. Small spines had been previously noticed in corresponding beds at the Tin Mill Coppice, near Bringewood. Traces of the fish bed have now been satisfactorily observed near Kington, Lucton, Richard's Castle, Ludford, Downton Castle Bridge, round the Ludlow promontory; at Hagley and Gamage Ford, round Woolhope; and at Longhope, Blaisdon Edge cutting and Flaxley, in the prolongation of the upheaval towards the Severn. I have found fragments of it in the gravel between Leintwardine and Clungunford.

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valley of Wigmore, though not so regular and perfect as that of Woolhope now so well known, deserves a more extensive examination than we were enabled to give it. Its physical features are very striking. The escarpment and slopes from the fault at the Bow bridge over the Teme, along Bringewood Chase to Mary Knoll, Whitcliffe and Ludlow; thence by Ludford to Richard's Castle, the High Vinnals and Gatley, and the exterior diverging escarpment from Orleton Common to Croft Ambrey and Aymestry, with the numerous transverse valleys by which they are cut into and through, especially Mary Knoll Dingle, the Hay Park, Croft Castle Dingle and Aymestry Valley, afford most instructive sections, in many places abounding with fossils. The broken-up strata of the lower escarpment, forming the picturesque knolls from Aston Common to Elton and Leinthall Starkes, cannot fail to attract attention; whilst the road from the finger-post at Elton to Richards' Castle and Orleton presents excellent sections of the Wenlock Shales and limestone, the lower Ludlow beds, Aymestry limestone, and upper Ludlow with the Downton beds—in fact, the greater part of the upper Silurian—into the Old Red Sandstone. The valley of Wigmore abounds with the detritus of the surrounding rocks, which was also found swept out over portions of the Old Red Sandstone between Ludlow and Leominster. The absence of gravel within the valley of Woolhope has been remarked by Sir Roderick Murchison.

These visits having thus made us acquainted with good types of the upper Silurian beds in regular succession, in their most classical localities, the Kington meeting was designed, for the examination of the Nash-scar limestone, near Presteign, and the igneous outburst of Radnor and Stanner. The position of the Nash-scar limestone, originally regarded by Sir Roderick Murchison as the equivalent to Wenlock (= Dudley and Ledbury) limestone, has given rise to some controversy. Professor Sedgwick, in his first visit to the district, suggested that it was of an earlier date, the equivalent of the lower band, appearing in the centre of the Woolhope valley, and which Sir Roderick had classed as Caradoc or lower Silurian. The Geological Staff of the Ordnance Survey adopted the Professor's views. The question has been carefully investigated by J. E. Davis, Esq., of the Middle Temple, our honorary associate, and happily on this occasion we had the benefit of his presence, and under his direction examined the most interesting points of the district. A paper on the age and position of this limestone was read by him before the Geological Society of London, in May, 1850, which will be found in their journal of Nov. of that year, in which the question, confessedly one of difficulty, is very ably discussed. Since the question was mooted, more extended observations have removed the Woolhope limestone from the Caradoc into the Wenlock series; so that the question is now, to which of these bands —viz., the upper or lower Wenlock limestones—is the Nash-scar limestone to be referred. The evidence collected by Mr. Davis, more especially, of the organic remains (for mineral structure quite fails in this case), inclines me to the position originally assigned to it, by Sir Roderick. The Nash-scar affords a fine example of metamorphic or altered limestone, occasioned by contact with igneous matter, injected against or between the strata, maintaining a high temperature, under great pressure, for a considerable time, producing a complete change of mineral structure, destructive of stratification, and in some parts of almost all traces of

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organic remains. The actual junction of these rocks is not here seen, but the examination of similar phenomena at Radnor, where the igneous rock and limestone are actually fused together, and where traces of organisms are found within a few inches of the junction, leaves no doubt that the causes of these changes are correctly assigned. A considerable thickness of Caradoc sandstone and conglomerate, undistinguishable from the Malvern conglomerate in its mineral and organic structure, is observed at Corton, and in Cam Wood, here highly charged with characteristic fossils of the upper portion of the lower Silurian rocks, and affording evidence of the very slow nature of the deposit itself, in the repetition of fine strata, distinctly marked by regular lines of small well-rounded quartz pebbles, with organics, evidencing the recurrence of floods and flushes at short and unequal intervals.

From the summit of Nash Hill or Cam Wood a view was obtained northward to the small outliers of Old Red Sandstone, showing the former continuity of that formation, over the older rocks of Siluria, traces of which are found many miles to the north in Shropshire.

With this imperfect sketch, our notice of the last year's excursions must terminate. Radnor and Stanner and the immediate neighbourhood of Kington demand an early visit. We do not appeal to these notices of our excursions as having contributed any considerable advance in science, but more modestly, as evidence of the industry with which some of our members at least are actuated, and of the utility of such associations as our little club, in opening and rendering popular such researches ; and we are confident that we shall not be unsuccessfully or uselessly employed, if in the progress of future years we follow up our enquiries with a little increasing interest and perseverance.

The strata of Herefordshire are now, as regards position, very well known. There is no longer a doubt that the Old Red Sandstone, which forms so great a part of its area, dipping in the south under the coal formation of the Forest of Dean, is of enormous thickness, and rests upon the deposits called Silurian, which are brought up from below in the country extending from the left bank of the Severn, near the Wrekin, to Ludlow ; thence by Richard's Castle, Croft, Shobdon, Kington, along the north-western parts of Herefordshire, to Hay, and so on to the sea coast of Pembrokeshire, supporting the great coal field of South Wales, and reposing themselves on the Cambrian or older rocks of that country ; again, along the eastern border from Abberley to Malvern, and are thrust through it at Tinker's Hill and Cainham Camp, near Ludlow ; at Shucknell and Hagley, near Lugwardine ; more remarkably round Woolhope, and further south, at May Hill ; and again, on the left bank of the Severn at Tortworth, in Gloucestershire. The Gloucester and Hereford Railway exhibits a solitary section of these Silurian beds, contracted into a few yards at Blaisdon edge, but skirts within a mile the Woolhope upheaval, which forms the beautiful landscape on the left bank of the river Wye, seen from the line near Holme Lacy ; and the Hereford and Shrewsbury Railway, cut through the Old Red Sandstone, all but touches the Silurian outlier of Tinker's Hill, between Woofferton and Ludlow, and just exposes a junction of those rocks at the entrance of the tunnel at the latter place. The intermediate line, from

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Blaisdon to Ludlow, a distance of between 40 and 50 miles, is altogether through the Old Red Sandstone, exposing good section of strata, with every degree of inclination, and considerable beds of detritus, It is difficult to ascertain or even approximate to the thickness of strata comprised in such an area; this must be sought for in the escarpments and ridges of the Black Mountain, and the river channels of South Wales, where a good succession is observed, and which, when fairly invoked, give an estimate of at least 10,000 feet. The strata in Herefordshire are pierced by a single trap dyke at Bartestree, near the Hagley dome, full particulars of which will be found in the Silurian System, as well as of a similar dyke at Brock Hill, on the left bank of river Teme, near Shelsly Beauchamp, on the borders of Worcestshire. Let me add, that the name "Silurian" was happily selected by Sir Roderick Murchison to include the strata immediately below the Old Red, prevailing over the territory occupied by the ancient Silures and their neighbours, and superimposed on the Cambrian or older rocks of North Wales; and the names of Ludlow, Wenlock, Caradoc, and Llandeilo direct the enquirer to those districts where he may find the strata instructively exhibited in a true descending order. Carefully as these strata have been examined, there is still detail to be made out, and abundant pleasure to be derived from their identification. The zealous explorer need not fear but that he will be rewarded with discoveries. The Hagley dome, replete with interest, brought to light by the late Mr. Scobie, had escaped for 20 years all other explorers, including the staff of the Ordnance Survey, who had bestowed with excellent results so much time and strength on the examination of the immediate district round Woolhope. I cannot forbear the remark, that the names of those friends, whose premature departure we have so much reason to deplore, are associated in the record of this discovery.*

Few organics have yet been collected from the Old Red Sandstone of Herefordshire, in comparison with what have been found in Scotland and elsewhere. I have not heard that the railway cuttings have produced a single specimen; but there are many localities where they have been found, and which have hitherto been scarcely examined. The detritus and gravel, of daily increasing interest, will be found a rich and productive field. The nature and distribution of soils and vegetables naturally invite our examination, and we trust will be followed up by some of our members who have already, in the previous year, shown themselves not unequal to the task, and who will thereby be enabled to vindicate the study of natural history, to the "cui bono" enquirer. There is, however, a higher view, which we must not lose sight of. Endowed with reason, man is called on all sides to the contemplation of God's works, and, enlightened by God's grace, to the study of His word. In one he sees the manifestation of Almighty power and wisdom; and in the other of Divine love and mercy to mankind. In the words of Professor Sedgwick, to whom I have been privileged to listen as a master, in his delightful book on the Studies of the University of Cambridge:—"The studies of mankind have sometimes been divided into natural, moral, and religious.

* See a paper on the protruded mass of the upper Ludlow rocks at Hagley Park. Herefordshire, by Hugh E. Strickland, Esq., F.R.S., &c., in the Quarterly Journal of the Geological Society of London, November, 1852.

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Each branch requires its appropriate training, and yields its own peculiar fruit. A study of the natural world teaches not the truth to revealed religion; nor do the truths of religion inform us of the inductions of physical science. Hence it is that men whose studies are confined to one branch of knowledge, often learn to overrate themselves, and so become narrow-minded. Bigotry is a besetting sin of our nature. Too often it has been the attendant of religious zeal, but it is most bitter and unsparing when found with the irreligious. A philosopher, understanding not one atom of their spirit, will sometimes scoff at the labours of religious men; and one who calls himself religious will, perhaps, turn a harsh judgment, and thank God that he is not as the philosopher, forgetting all the while that man can ascend to no knowledge, except by faculties given to him by his Creator's hand; and that all natural knowledge is but a reflection of the will of God. In harsh judgments, such as these, there is not only much folly, but much sin. True wisdom consists in seeing how all the faculties of the mind and all parts of knowledge bear upon each other, so as to work together to a common end, ministering at once to the happiness of man, and his Maker's glory."

Gentlemen,—I return you my most sincere thanks for the honor conferred upon me, in selecting me as President for the second year of your existence, and for the courtesy you have shown me during the period of my office; and with pleasure I resign it to Mr. Symonds, whose ability and zeal for the promotion of natural science are well known to you all; assured that you could not have made choice of anyone who will carry out the objects of our club with more advantage than he who so readily co-operated in its formation, and has been so successful in his attempt to establish a sister club at Malvern.

Bridstow Vicarage,
30th Nov., 1855.

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Woolhope Naturalists' Field Club.

JOINT MEETING, WOOLHOPE, MALVERN, AND COTTESWOLD CLUBS, TUESDAY, JUNE 13TH, 1854.

SPEECH HOUSE, FOREST OF DEAN.

The second joint meeting of the Woolhope, Malvern, and Cotteswold Naturalists' Field Clubs, fixed in pursuance of a resolution passed at the first meeting held at Eastnor, on the 7th of June, 1853, was held on Tuesday, 13th June, at the Speech-house, in the Forest of Dean.

The Malvern and Cotteswold Clubs met at breakfast at Newnham, transacted their special business, and thence proceeded to the Speech-house.

The Woolhope Club met at 8.30 a.m., at the King's Head Hotel, Ross, where they breakfasted, and held their ordinary meeting, under the presidency of the Rev. T. T. Lewis; Mr. T. T. Williams, of Wessington Court, was unanimously elected a member; and a number of gentlemen were proposed to be balloted for at the July meeting, which is to be held at Monmouth Cap. It was agreed that the address of the Rev. T. T. Lewis, on retiring from the office of President in January last, together with a narrative of the Club's proceedings, and a selection of the papers read at its meetings, be printed for the use of the members; and it was arranged that the Printing Committee should meet at Hereford on the evening preceding the next meeting, for the purpose of carrying out the resolution.

The desirability of purchasing a set of Meteorological instruments, and requesting one of the members to undertake the keeping of a series of observations, was discussed at some length, but the decision was postponed until the July meeting.

At 10.15 a.m., the members started in a stage coach, (supplied by Messrs. Bosley, of Hereford), for the Speech-house. The morning had been marked by heavy rain, but by this time the sky cleared, and the rest of the day was fine, with the exception of some flying showers. The route taken was along the south bank of our beautiful Wye to Lydbrook, a portion of the river which is scarcely excelled even in any part of its course, for scenery. The luxuriance of the vegetation; the various forms of the richly wooded hills; the serpentine windings of the pellucid Wye; the picturesque Court and gray old Castle of Goodrich; the venerable Churches of Walford, English Bicknor, and pretty villages, nestling among the foliage; and the succession of comfortable and elegant mansions studding the slopes, all showed to perfection. The thousand different lights and shades, thrown from the April-seeming sky, gave as many varied effects, as the clouds scudded swiftly across the landscape. Considering the state of the atmosphere, the views were remarkably extensive, while they could not have been seen to greater advantage.

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A striking contrast to this scene of pure natural beauty was presented as the party entered the deep glen in which the thriving village of Lydbrook is situated. There the songs of birds were unheard amid the heavy blows of the forge hammer; and the clouds of dense black smoke—an unpleasant proof how plentiful coal is, since so much of its main ingredient (carbon), can be wasted—shut out the bright sunlight. In passing the various factories and workshops, the eye was caught by the golden brightness of the heated iron, which was being cut, hammered or rolled into various forms; the members however, did not stay to enter into any of the workshops.

Having passed through the village, and begun to mount the steep ascent which leads to the summit of the lofty ridge which here forms the rampart, as it were, of the Forest, the members alighted, and devoted a few minutes to the observation of the fine selection of the Mountain Limestone-rock, and of the unproductive Coal-measures, which are presented on the bare faces of the hills. In passing, the pretty new Church attracted a glance of interest, while it was also noticed that, on the hill above, the haymakers were at work.

On reaching the summit of the long ascent, the members proceeded onwards on foot through the broad glades of the noble Forest to their place of meeting. After reaching the Speech-house they separated into two parties, in order to pursue their geological and botanical observations.

The Botanists explored the "greenwood shade" under the guidance of Mr. Purchas and Mr. Lingwood; while the Geologists, led by the Rev. T. T. Lewis (by whose researches Sir R. Murchison was so much aided in the investigation of the Silurian system) proceeded in the first instance to the coal pits and works of the Gully level. Thence they made their way to Park-end, where they spent a considerable time. At the latter place, some fine specimens of fossil ferns and casts were obtained from the shale.

The party also spent an instructive hour at the tinplate works of Mr. James. Here they were courteously received by the proprietor, who conducted them through the works, showing and explaining the various processes of rolling the bars of iron into plates, cutting them, annealing them in the furnaces, pickling them in sulphuric acid, coating them with tin, and finally polishing them for the market.

The Botanical party did not find the Forest so rich in common plants as might have been anticipated, but they obtained a number of specimens. At 4 p.m., the members of the various Clubs, about 70 in number, re-assembled at the Speech-house to dinner.

The place of meeting being within the district of the Cotteswold Club, its President, Mr. T. Barwick Baker, presided, and the Vice-chairs were filled by the Rev. W. S. Symonds, Rector of Pendock, and President of the Woolhope and Malvern Clubs, and the Rev. T. T. Lewis, Rector of Bridstow, formerly President of the Woolhope Club. There were also present the Right Hon. Earl Ducie, Rev.

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H. Bellairs, H.M. Inspector of Schools, Mr. Herbert Mackworth, H.M. Inspector of Mines, the High Sheriff of Gloucestershire, Sir M. H. Crawley Boevey, Bart., and Mr. E. D. Pyrke, Verderers of the Forest, Mr. J. Atkinson, Deputy Gaveller, and others.

On the removal of the cloth, the Chairman gave the health of the Queen. This toast was followed by the health of the President of the Malvern and Woolhope Clubs, in acknowledging which toast, the Rev. W. S. Symonds stated that they had hoped to have been favoured by the presence of Professor Phillips, of Oxford, and of Sir R. Murchison, but that other engagements had rendered those eminent geologists unable to attend.

In the course of the evening, a member of the Cotteswold Club mentioned a singular fact showing that the Hedgehog is carnivorous. His gardener, while at work, had heard the scream of a leveret, and on going to the spot found a hedgehog devouring the leg of one. He had previously suspected that the disappearance of some chickens was to be accounted for in the same manner.

Mr. Jones, of Gloucester, read a short paper upon the Rhynchonella of the Oolite," a fossil allied to the Atrypa and the Terebratula, which showed close observation and extensive knowledge of fossil conchology. A collection of specimens of the fossil was handed round for inspection.

The Rev. J. H. Thompson, of Worcester, announced the discovery of two plants new to Worcestershire, in the neighbourhood of Evesham, viz., the *Carex montana*, and the *Potamogeton flabellatus*, of which he produced specimens for the inspection of the botanical members.

The Chairman remarked that at the Eastnor meeting, the drawing up of a complete Flora of the three districts had been committed to Professor Buckman, Mr. Lees, and Mr. Purchas. The two former gentlemen had previously completed their portions, and he wished to know if the Herefordshire portion was near completion.

Mr. Purchas observed that the work was in progress, but was not yet sufficiently advanced for publication.

The Chairman read an extract from a letter received from Sir Thomas Tancred, now in Australia, the former Secretary of the Cotteswold Club, upon the model of which the other two had been formed. The letter announced that a number of specimens of plants, insects, etc., illustrating the Flora and Fauna of Australia, had been sent to this country. The members of the different clubs were invited to meet the Worcestershire Naturalists' Club, at Worcester, in September next.

Mr. Herbert Mackworth then delivered an interesting address on "the Ventilation of Mines." He briefly sketched the different stages of the conversion of vegetable matter into Coal, observing that in its first condition, that of Lignite, its exhalations consisted of watery vapours; in its next stage it gave off carbonic

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acid, or "choke-damp"; in its third stage, it exhaled carburetted hydrogen, or fire damp; and lastly, having giving off all its gaseous contents, it was reduced to anthracite, or stone-coal. He observed that the Coal-measures of the Forest of Dean were composed of coal in the second stage. He then proceeded to explain the means whereby these exhalations may be dissipated by the ventilation of the mines, and exhibited an improved Davy lamp, and a model of an anemometer, or gauge of the quantity of air passing through a mine. Mr. Mackworth's explanations were remarkably lucid, and delivered in a very pleasing and effective manner. The address was much applauded.

Mr. Atkinson produced, and explained, a series of plants illustrative of the mining operations in the Forest.

The company separated at 7 p.m.; the members of the Woolhope Club making their way back to Ross, where they also separated. The Hereford members reached this City at midnight, having spent a very instructive and agreeable day.

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Woolhope Naturalists' Field Club.

TUESDAY, JULY 18TH, 1854.

LEOMINSTER.

Another of the pleasant and instructive Field Meetings of this Society took place at Leominster, on Tuesday, 18th July, the district proposed for investigation lying between the town of Leominster, Kimbolton Church, Lever Hill, Puddlestone, Brockmanton, and Bach.

Geologically situated upon the Old Red Sandstone, which it is regretted has hitherto remained in Herefordshire almost a "terra incognita," a doubt rested upon the minds of the geologists present as to the probable interest of the day's proceedings. We are happy, however, to record that the investigations were more than ordinarily fruitful, and some facts were ascertained which were not only highly interesting to the members present, but will tend to throw additional light upon the geology of the county.

The weather was remarkably fine; there was a fair attendance, and the extreme beauty and richness of the surrounding scenery rendered the meeting a most delightful one.

The Hereford members assembled at the railway station after breakfast, and proceeded by the 9.40 a.m. train, to Leominster. On their arrival at the Royal Oak Hotel, the party was increased by members from the surrounding district, and the ordinary business of the club was transacted; seven new members were balloted for, and duly elected, a fact which indicates that the love of the delightful study of Natural History is on the increase.

At 11 a.m., the party started in a special coach for Lever Hill, under the able guidance of the President, of that celebrated geologist, the Rev. T. T. Lewis, of Aymestrey, and also of the Rev. Thos. Hutchinson, of Kimbolton, whose extensive local scientific knowledge was the means of adding considerably to the day's enjoyment. As the party proceeded, Mr. Lewis explained that the portion of the Old Red Sandstone to be explored was the central and largest of the deposit, consisting of spotted green and red clays and marls, affording on decomposition, the richest soils, and also containing irregular courses of red and green earthy limestone, locally termed "Cornstones," usually consisting of small concretionary lumps, but expanding here and there into large sub-crystalline masses.

The first spot visited was the quarry on the southern approach to Lever Hill, exposing the Cornstone and accompanying flagstones of the district. Attention was immediately attracted by the organic contents of the rocks. Every fragment around was filled with the evidence of former life; the remains being principally those of the characteristic fossil, the "Cephalaspis."

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No party of Australian gold-diggers could be more excited in their search than were our naturalists. The blows of the hammers at work resounded at every corner, exclamations of astonishment here, delight there, and eager enquiry all around were heard without intermission, to the no small astonishment of the work-people, whose countenances showed evident marks of the wonder within.

Hugh Miller's eloquent description of life in those early seas in which the surrounding rocks were deposited, and in which lived those extraordinary animals whose remains lay entombed in every fragment around, was brought forcibly to mind. In opening his description of the Middle formation he says:—"The curtain rises, and the scene is new. The myriads of the Lower formation have disappeared and we are surrounded on an Upper platform by the existence of a later creation. There is sea all around, as before; shoals of Cephalaspides, with their broad arrow-like heads and slender angular bodies, feathered with fins, sweep past like crowds of cross-bow bolts in an ancient battle. We see the distinct gleam of scales, but the forms are indistinct and dim: we can merely ascertain that the fins are elevated by spines of various shapes and patterns: that some of the coats glitter with enamel, and that others—the sharks of this ancient period—bristle over with minute thorny points."

On their route to Puddlestone, the members visited several other quarries equally abounding in organic remains.

From the summit of Lever Hill, Mr. Lewis directed attention to the general geological features of the extensive view from that commanding spot. Looking towards the north, to the left lay his own peculiar district of Aymestrey, where he laid the solid foundation upon which Sir R. Murchison raised his splendid superstructure of the "Silurian System." In front lay Tinker's Hill and Caynham Camp, a remarkable and isolated upheaval of Upper Silurian rocks, lying between the Ludlow district on the west, and on the east the Clee Hills, which last are composed of the upper beds of the "Old Red," capped by Mountain Limestone and workable Coal Measures, and surmounted by basalt, which is seen to have been erupted through the entire series, and to have overflowed on the top of the hill.

Thence the members proceeded in a south-easterly direction towards the pretty little church of Puddlestone, recently restored, which was visited by the whole party, and much admired.

Mr. Elias Chadwick, the High Sheriff of the County, here met the Club, and kindly invited them to Puddlestone Court, where they partook of his hospitality in the form of luncheon. The Court, an elegant castellated building, is built of stone taken from a quarry hard by, opened in the "Old Red," and supplying materials of a most beautiful and durable description.

Bidding adieu to their kind entertainer, who conducted them personally through his grounds, the members proceeded to examine the quarry in question. Here a discovery was made which we believe to be unique in the history of the "Old Red," of Hereford. Upon blocks of a purplish rather thinly laminated sandstone were distinctly observed the ripple marks produced by waves of

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primeval seas, and traversing the blocks in every direction, the footprints probably of crustacea as they roamed at the bottom of their native ocean. A specimen of this remarkable "medal of creation" was carried away, and will be forwarded by Mr. Lewis to London for examination, and we hope to be able to revert to the discovery on a future occasion.

From this spot, the party made the best of their way to Leominster, passing Brockmanton, Bach, and Puddlestone, and arrived at the Royal Oak at 5 o'clock, where an excellent dinner was provided for them by Mr. Jackson in his usual style. The President, the Rev. W. S. Symonds, of Pendock, occupied the chair, and there were also present Rev. T. T. Lewis, Rev. J. F. Crouch, Rev. H. Barker, Rev. H. T. Hill, Messrs. W. Stubbs, Woodhouse, H. Price, T. H. Lee Warner, Dr. Rowan, Rev. T. Hutchinson, Messrs. Arthur Thompson, and Jas. F. Suter, Honorary Secretary.

After dinner, the Rev. Thomas Hutchinson was proposed as a member by Mr. Crouch, and seconded by Mr. Thompson, and in consideration of his services on that day, it was proposed by Mr. Lewis, and seconded by the President, that the formality of the ballot be dispensed with; he was accordingly enrolled a member.

A highly practical and suggestive paper was read by Dr. Rowan, on the fracture of iron, which gave rise to an animated conversation.

THE FRACTURE OF IRON.

By Dr. A. Rowan.

My attention has been called to a notice which appeared in a number of "Chambers' Edinburgh Journal" stating that a paper had been read before some of the Philosophical Societies upon the "fatigue of metals"—(this term is used by way of explanation of that property possessed by metals whereby they are subject to fracture from repeated strains). I desire to lay before this Club a few particulars relative to the crystallisation of iron occasioned by percussion.

It has been ascertained, upon the examination of railway axles which have been fractured (by which accidents of a serious nature have occurred), that the fracture was always crystalline, although the axles, when constructed, were originally fibrous. The same thing occurs with the coupling-rods of railway carriages. The repeated jerks they receive, especially at starting of trains, render them liable to break, and when broken, the fracture is invariably crystalline.

I have myself observed that some smiths, in the process of forging iron, render it peculiarly susceptible of breaking, and others again materially improve the quality of the iron they work; and I have observed a difference in the percussive force of the blow given by each, the blow of the latter being like the solid stroke of the tilt-hammer, whereas the blow of the former rebounds from the iron as he strikes, like the stroke of a stonebreaker.

I was conversing a short time back with a practical and very intelligent workman upon the subject, and he related many instances in which he had

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observed similar phenomena. One instance he mentioned was of a very singular character: an engineer on board one of H.M. steamships, observed that a very strong connecting-rod attached to the side valves, in the course of a very short time, broke, or rather twisted, off; others were substituted, every care was taken in their manufacture, and the best iron procured, but with like results; at length he tried what is termed in trade as "faggoting," which means the welding a number of bars together; but still the same accident occurred, and whether the iron was fibrous or laminated, the fracture always presented a crystalline structure, the molecules having arranged themselves differently during the repeated percussions which acted upon them; at length, it suggested itself to him to have a hole drilled through the rod, after which the bar lasted for years without undergoing any perceptible change.

Now, how the hole in the centre prevented the crystallisation of the iron and its consequent fracture is a problem difficult to solve, unless we assume that it is subject to the general laws of crystallisation, a nucleus or centre being first formed, around which the different molecules arrange themselves until a perfect form of crystallisation is effected.

This I have frequently found to be the case in the crystallisation of salts in solution:—for instance; a sample of the iron liquor obtained from the Park End Tin Works at our last meeting in the Forest of Dean, refused to crystallise although concentrated to a point at which crystallisation might reasonably be expected; but as soon as a small particle of the sulphate of iron was placed in the liquid, crystallisation commenced, and continued uninterrupted. In this way, I apprehend, the centre being removed from the bar, no crystallisation could take place, and the iron would preserve its fibrous or laminated structure. It is a fact, also, observed by practical men, that, when iron, which has assumed the crystalline structure is heated, and then gradually cooled (which is called "annealing,") it again resumes its fibrous texture.

LIST OF PLANTS OBSERVED.

The following list of some of the rarer plants observed during the day, was handed in by Mr. Hutchinson, and other members:—

Trifolium medium.	Onobrychis sativa.
Melilotus officinalis.	Genista tinctoria.
Nardus stricta.	Pyrola minor.
Helianthemum vulgare.	Scrophularia Ehrhardti.
Anthyllis Vulneraria.	Trifolium medium.
Orchis pyramidalis.	Epilobium montanum.
Chlora perfoliata.	Circaea alpina.
Aurantia arvensis.	Sedum album.
Hypericum pulchrum.	Linaria minor.
Geranium lucidum.	Lycopsis arvensis.
Ophrys apifera.	Euphorbia exigua.
Rhamnus catharticus.	Typha latifolia.
Spartina stricta.	Poa compressa.
Agrostis vulgaris.	Fedia dentata var. mixta.

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Mr. E. Davies, of Hereford, produced a specimen of *Gastridium lendigerum* (Nit-grass) discovered by himself at Breinton, near Hereford, with respect to which the following letter was read from Mr. Purchas, of Ross :—

"It may be as well to communicate to the Club the various additions to the list of Herefordshire plants, as they are successively made; perhaps, as I cannot be present to-morrow, you will do me the favour to state that I have lately received from Mr. E. Davies, of Hereford, specimens of the Gastridium lendigerum or "Nit-grass," which he has discovered at Breinton. This is a somewhat unexpected addition, because the plant usually, though by no means universally, is found in the neighbourhood of the sea coast."

The President afterwards favoured the members with an excellent paper on the Old Red Sandstone, and particularly with reference to the country visited.

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THE OLD RED SANDSTONE OF HEREFORDSHIRE.

By Rev. W. S. Symonds.

The series of stratified deposits which occupy the greater part of this County is called the Old Red Sandstone, or Devonian group, and lies between the Silurian and Carboniferous strata. At the close of the long Silurian period, a great change occurred in the character and colour of the deposit, over large areas of those primeval seas. We find the gray mud of the Upper Ludlow rock succeeded by red sediments, and this red colour is owing to the influence of iron oxides. Whole tribes and families, with which we are familiar in the Silurian beds, perish and disappear, and the tenants of the deep, whose records we have traced amongst the limestone and mudstones of the upper Silurians, pass away for ever, and scarcely a species of the Old Red Sandstone group, in whatever part of the world it has been examined, is identical with the creation which rests below.

A careful investigation of the thickness of the Old Red Sandstone, by Sir Roderick Murchison, and the Government Geological Surveyors, gives its enormous depth at not less than 8,000 to 10,000 feet. It was originally divided by Sir Roderick into three groups of deposits: (1) a quartzose conglomerate passing downwards into (2) chocolate, red, and green sandstone, and marl; and (3) the tilestones. It is now however ascertained, that this lower or tilestone division penetrates rather to the Silurian rocks, for the fossils agree in general character with those of the Upper Ludlow which lie immediately beneath. The Cornstone group, with its many irregular courses of mottled red and green earthy limestones, is the true Old Red deposit which succeeds the tilestones, and these are more especially the beds which we have journeyed to investigate this day.

Far above our heads, however, in by-gone periods of our planet's history, there existed upon this Cornstone group the upper quartzose conglomerate No. 1. Enormous denudation and excavation have long since borne away every particle of these upper beds from this district.

I had the pleasure of examining their contemporaries and equivalents on the sides of the Blorenge some months since, in company with several members of this Society, and it may not be uninteresting if I allude to our observations. The pleasant town of Abergavenny, surrounded as it is with picturesque hills all exhibiting the immense development of the Old Red Sandstone, was our starting point. We were met at the station by our hospitable entertainer and lately elected member, Mr. Elmes Y. Steele, and with our Honorary Secretary (Mr. Suter) for our guide we commenced the examination of the Blorenge.

The valley of the Usk is a great line of fault, caused no doubt by intense earthquake action that succeeded the Coal period, when the thick floor of the

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palaeozoic deposits was broken up and laid on edge,—when volcanic eruptions and overflows took place that exterminated every living creature in those ancient seas,—when consolidated mineral masses, such as the Malvern Syenite, deep down in the bosom of the earth, were thrust upwards from below, to form a mountain chain upon the planet's surface,—when, in short, one great epoch ceased to be, and another creation, fresh from the Creator's hand, came forth at His fiat, to live and breathe and enjoy.

Along the sides of this valley we observed immense mounds of boulders and gravel. the detritus of materials that once occupied a surface far above our heads. The rough sand and rolled pebbles were all that remained of the immense masses which once connected the Blorenge with the Scyrrid, and Pen-cerig-calch. We gazed in wonder at the mountains around us, not only as evidences of the enormously long period during which those boulders and pebbles were gathered together in bye-gone ocean beds, but still more as proofs of the furrowing out of the strata which at one period filled up the very valley we were walking up, to the depth of more than 2,000 feet, and united the widely separated mountain masses around us.

As we ascended the Blorenge, we saw, *in situ*, the red and green Cornstone deposit so common in this part of Herefordshire; and I would here call particular attention to this Cornstone group, as it appears above the detritus of the Usk Valley, on the sides of the Blorenge, and more especially on the northern escarpment of the Scyrrid, for it is by such examples the young geologist learns to connect strata with strata, though separated often by many intervening miles. In the Blorenge the Cornstone is not well developed; but the remarkable ridge of the Scyrrid, where of old the Druid worshipped, and which we shall I trust visit on our expedition next month to Monmouth Cap, exhibits a fine section of thick beds of true Cornstone, passing under red, brown, and chocolate sandstones, and surmounted by the quartzose Conglomerate, the uppermost member of the Old Red Sandstone, the composition of which so much excited our curiosity on our visit to the Blorenge, of which more anon. It is this Cornstone group of the lofty mountains of the Breconshire Fanau, of the Blorenge, the Sugar Loaf, the Scyrrid, and all the hills around Abergavenny, that once was continuous with the hills of Foxley, Moccas, Weobley, Tenbury, Bromyard, Dinmore hill, and Robin Hood's Butts (the Pyons). The upper beds, the Old Red Conglomerate, are as I said before gone from the hills of the district; swept away, but still left on the summit of the Scyrrid. On the Blorenge again other beds, the representative of another age in the planet's history, are piled as monuments of the wondrous past.

We passed on the Blorenge, upwards, from these Cornstone beds which there are not well developed, to the pebbly beds and conglomerates which constitute the upper bed of the Old Red Sandstone,—form the underlying encircling edge of the great South Welsh coal basin, and of Dean Forest—which appear in large subcrystalline masses on the western face of the Brown Clee Hills—are seen below the Carboniferous limestone at Symond's Yat, on the gorges of the Wye—and rest above the Cornstone on the summit of the Scyrrid. This upper member

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of the Old Red Sandstone, or substratum of the Carboniferous limestone, is composed of pebbles of white quartz in a red matrix, varying on the Blorenge from the size of a pea to that of an orange; and much did we speculate on the former history of these white quartz pebbles and that ancient red mud. At what depth of the ancient planet was that silex formed? What ancient land or sea-girt rock composed the coast from whence they came? In which direction rolled the current which deposited them in the red mud, now as hardened as themselves? We know that strange forms of fishes inhabited the seas whose waves thus rounded them; but what of the shores? What land animals then lived? What trees grew upon the hills of that far-off period? The little reptile of the Upper Old Red (Telerpeton Elginensis) is all that answers to our question; and one fragment of coniferous wood is the only information we possess of a true tree vegetation.

There is another history, however, connected with a hill near the Blorenge, the very mention of which bewilders the mind if unaccustomed to the wonders of geology, and the revelation of which we can only compare to the marvels of astronomy, when we learn "that suns and systems are more numerous than the sand upon the sea shore." The hill is called Pen-cerig-calch, or the "Hill of the limestone-peak." Well may the geologist stop and contemplate that hill; there is a wondrous inscription chiselled upon its rocks. In ascending the Blorenge we leave the Old Red Conglomerate, and find resting comformably upon it the lowest member of the Carboniferous series, the Mountain Limestone; above this again rests the Millstone Grit, to which succeed the Coal Measure shales and sandstones. Pen-cerig-calch is a separated mass of Old Red Sandstone, and on the top also is a detached mass of Mountain Limestone and Millstone Grit, corresponding bed to bed and strata to strata with the opposite deposits on the Blorenge. The Mountain Limestone and Millstone Grit of the Blorenge, and indeed of the whole of the great Welsh coal basin, dip under deposits which in South Wales have been ascertained by actual measurement to attain the thickness of 12,000 feet; and who shall say that the same beds have not been formerly extended over the Pen-cerig-calch, above the Scyrrid, above the spot where we now stand?

The Forest of Dean is but an island of the great Welsh Coal basin, preserved from denudation. The Coal beds of the Clee Hills are but the shores of vast deposits which once extended far above those beds which now constitute the surface of the most of Herefordshire; and though the statement may seem more like the tale of a fairy land, yet we know that we speak truth when we assert that a vast area above and around us for thousands of feet together, now only occupied by the thin air or the soaring lark, was in former periods of this planet's existence filled by a mass of sediment, the product of unnumbered ages, accumulated layer upon layer, the upper surfaces of which were occupied by vast forests drained by great rivers, where the finest vegetation the sun ever shone upon flourished for a time, and when its hour was passed was elaborated by the Power of all-seeing Wisdom into the mineral, which of all others most adds to the comfort, the greatness, and happiness of man.

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On the sides of the Blorenge, as we descended, we observed the impression of a plant that lived in the ages of the Coal; the vivid impression of a large fossil, a gigantic Calamite, was marked out upon a mass of sandstone and grit that lay against the hill. A "view halloo" announced the discovery.

I would now revert to the deposits of this immediate neighbourhood, the Cornstone group.

Wherever in the Hereford district (of course always excepting Silurian upthrows, such as the Woolhope and Dormington hills) you see verdant and wooded hills, there is the Cornstone formation, with its valleys denuded in the softer marls, and the hills made up of concretionary nodules and gritty sandstones. The fact that these hills have been preserved from destruction is owing to the hard, impure limestone nodules of which they are composed. Occasionally the land of the Cornstone is spoiled by its contiguity to the upper beds of the mountain ranges, of the rocks of the Silurian region. In the parishes of Almeley and Lyonshall and the upper part of Eardisley, for instance, whole tracts are rendered barren by the boulder stones and coarse gravel composed of Silurian and trap rocks drifted from the neighbourhood of Kington and Aymestrey.

The valley of the Wye is a deep denudation in the Cornstone beds; and the strata of Wall Hills near Ledbury, Dinedor, near Hereford, Moccas, the hills of Weobley, Leominster, Bromyard, and Tenbury were all once continuous and joined. I suspect that the men of Herefordshire have very much to thank their Cornstones for, and that peroxide of iron combined with carbonate of lime is the great secret of the rich soil in the county. Nothing is more certain than that Herefordshire apple trees when transplanted will not grow Herefordshire cider. The cider of the Old Red Sandstone is altogether a different affair to the cider of the New Red, and no one ever saw a Dormington or Marden hopyard upon the New Red Sandstone.

You will remember our late lamented friend, Mr. Strickland, stated at the Eastnor Meeting last year, in opposition to an opinion advanced by the well-known botanist Mr. Lees, that he did not believe plants affected any limestone soil in particular, and he evidently supposed that the lime was the assistance and the mineral they most required. An active botanist of our society (Mr. Edmunds) must allow me to quote his opinion upon the same subject, although I had not alluded to the subject of lime in enquiries I made of him as to the Flora of Herefordshire. He says,—"I attribute the number of wild flowers to be found on the Old Red to the fact that the Silurians protrude in so many places, and that the soil and subsoil in all parts contain an unusual amount of lime, as compared with the New Red for instance. You have thus a greater variety of soil in the district, according to the varying proportion of lime in different parts of it."

It appears to me that lime is not the only ingredient that conduces to the fertility of Herefordshire. All limestone soils—the upper Silurian for instance—are not as fertile as the Cornstones. I believe therefore, with Dr. Rowan, that the iron oxides combined with the lime make the soil of this part of the county

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the rich and fertile land it is; and for this reason I have always, in my addresses and lectures on the Geology of Worcestershire endeavoured to induce our farmers to use more lime. We have the same iron oxides, but the Worcestershire New Red contains little carbonate of lime, and I therefore feel convinced that our agriculturists would gain by its addition, and that if a regular system of well liming the soil were persevered in for a few years, we should have finer crops, less squashy cider, and better beer.

As regards fossils, the Old Red Sandstone of Herefordshire is remarkably poor. There are no fossil shells, for the peroxide of iron has destroyed every vestige of their remains, and the relics of the fish of that period, so numerous in Scotland, and so celebrated through the works of Mr. Hugh Miller and Agassiz, are with us very few and far between. We must not however forget that temporary deposits in Devonshire contain abundance of fossil shells; and that, in Russia, the fish of Scotland and Herefordshire are entombed in the same rock with the shells and corals of Devon.

The Upper Old Red beds contain forms typical of the Carboniferous group which succeed, while the lower forms of life partake of Silurian aspect and demeanour. The fishes too die out through that long period during which the Old Red beds were depositing, for the Pterichthys of the lower strata had ceased to exist long before the conglomerates of the Blorenge and Scyrrid were washed into their bed, and of sixty fine species of remarkable fish but one (Holoptychius) ascends to the Mountain Limestone.

The Lower Old Red beds afford scarcely any traces of land plants, but its uppermost contain a considerable number, including tree ferns and Calamites, and thus shadow forth the period of the Coal. There is no abrupt break between the Silurians and the Old Red, or the Old Red and the Carboniferous epochs, but they seem, so to epeak, to glide into one another; and yet, "significant circumstance as to the lapse of time," we fearlessly assert that not one shell, fish, plant, or even coral, is common to them all.

One word, gentlemen, as regards ourselves and our collections. The practical value of a Local collection depends chiefly upon the history of individual specimens. A fossil from the Old Red Sandstone of Herefordshire has a value far beyond any accident of fineness or rarity; it is illustrative of the history of the Geology of our Native county. Chinese butterflies and Australian cuckoos are very well in their way, and gifts not to be despised when offered; I would rather however see in Hereford a Herbarium containing from 700 to 800 Herefordshire plants presented by one of the many good botanists the county can boast of, than all the foreign specimens of the British Museum. The same remark applies to fossils, birds, fish, or natural specimens of any kind.

It may be argued that the Old Red Sandstone of Herefordshire contains very few fossils; perhaps so; the Silurian rocks of Herefordshire are, however, particularly rich, and careful eyes would, I am convinced, detect the remains of the Old Red fish if careful eyes would but take the trouble to search. The Rev.

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Mr. Barker, of Hereford, has a fine remnant of a new species of Cephalaspis, which was forwarded by the late Mr. Strickland to Lord Enniskillen for examination. This, with about half a dozen other specimens in the private cabinets of Mr. Lewis and Mr. Suter, constitute the memoranda a stranger geologist may expect to find of that Old Red Sandstone of which Sir R. Murchison declares, "there is no such other tract in the world."

Gentlemen, I apprehend that the formation of these Societies is to extend the love of Natural History as an educational science, and that our aim lies beyond a dinner and a walk. I therefore think that every one of us should lend a helping hand towards making the Hereford Museum a practical Institution of the county and neighbourhood of Hereford. We are now engaged upon the same work at Malvern, and before another year has passed away we shall be enabled to give you tangible proof that the Naturalists of Worcestershire have not been idle. Let me then call upon you, as lovers of nature, to assist in the illustrations of the natural history of your own county. Geologists, make the rocks ring and yield up their treasures. Botanists, many a specimen you carelessly throw away would be worth noting and recording. We may one and all, if we choose, come forth with friendly aid and render some good service towards the illustration of the Natural History of Herefordshire, the dear old county of the "Old Red Sandstone."

Mr. Symonds proceeded to remark that he had lately found how true of geology was the saying of one of its greatest masters, that "its goal of to-day is the starting point of to-morrow." Since writing that paper he had been compelled to modify several of his opinions. It had been said that the Old Red of Herefordshire contained no fossil shells, but he now produced a specimen from the neighbourhood of Bromyard, which he was enabled to show them by the kind permission of the council of the Worcestershire Natural History Society, to whom it belonged, and which was undoubtedly Orthoceratite. He had himself, quite accidentally, met with the fossil in going over the collection of the Society, and it showed him how dangerous it was to form positive conclusions on mere negative evidence. He trusted the Old Red of Herefordshire would now receive thorough investigation and he had no doubt that a multitude of new facts would yet be brought to light through the medium of their Society.

A set of Meteorological instruments was ordered to be purchased, and to be placed in the hands of Hewett Wheatley, Esq., who has undertaken to make the necessary observations. From Mr. Wheatley's known ability we look forward to important results being obtained.

The President announced that the great Meeting at Worcester of the Natural History Clubs was fixed for the 10th of October, and that the Bishop of Worcester had consented to occupy the Chair. Professor Phillips of Oxford has kindly undertaken to deliver an address; and Professor Lindley, the eminent botanist and author, is also expected. Mr. Armstrong, of London, will conduct archæological parties and explain the principal features of interest in the Cathedral and

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City, and similar arrangements will be made with respect to every branch of science. He hoped that the Woolhope Club and their friends would muster strong on the occasion.

The health of the President was proposed by Mr. Barker, and the thanks of the meeting were presented to him for his excellent paper. The health of Mr. Lewis was proposed by the President, and in the course of his remarks he eloquently alluded to the eminent services the rev. gentleman had rendered to Geology and to the Woolhope Club. Mr. Crouch proposed the health of the Hon. Sec. (Mr. Suter): both of which toasts having been appropriately acknowledged, the meeting broke up. A happier party we have rarely seen.

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Woolhope Naturalists' Field Club.

TUESDAY, AUGUST 22ND, 1854.

MONMOUTH CAP, GARWAY, GROSMONT, &c., &c.

Another—and the last of the season—of the delightful and instructive field meetings of this club was held on Tuesday, August 22nd, at Monmouth Cap. The romantic beauty of the neighbourhood, one of the very finest bits of scenery in all our beautiful Siluria, and the many memorable names and deeds with which its chequered history in past ages has been filled, added no little to the interest of the day's explorations in a fresh district.

The day was singularly favourable to a full appreciation of the various sources of instruction and enjoyment. Now a brillant sunshine, giving almost intolerable brilliancy to the stately masses of cumulus cloud, then a grateful veil drawn suddenly across the sky, by a gathering of the light nimbi (or rain clouds). About noon, as the party were approaching the summit of Garway, a smart but brief shower pattered down upon the broad acres of ferns, of course without sparing the scientific travellers, who happened at the time to be wandering among them; but with that slight exception the weather was propitious, the swift moving lower stratum of rain-cloud merely adding a charm to the natural beauty so lavishly spread on every hand. To ruined castle, village church, wooded hill, hamlet-dotted valley, and far-stretching mountain range, a thousand gradations of light and shade gave endless variety of expression. To the botanist the picturesque brokenness of the country, lying as it does on the confines of the two Silurian counties, gave the day's explorations a special interest; while to the geologist the succession of lofty hills, islets of the mighty ocean-torrent by which the Old Red Sandstone was ploughed into valleys, after its Carboniferous covering had been swept off, was full of interest, all the deeper for the fact that that particular district had scarcely attracted the attention of geologists at all. Of course on such an occasion little could be done save to glance at the field, leaving the patient exploration of it to individual members who reside near the locality; but sufficient was ascertained to justify the assertion that the field is a promising one.

To descend (as Bunyan says) "from generals to particulars," we have to record that the day's meeting began by the assembling of about 20 of the members at the Monmouth Cap Inn at 9 a.m., most of them having been conveyed thither by the Newport, Abergavenny, and Hereford railway. Having experimented upon the chemistry of the breakfast table, a process not the less agreeable for the miles of fresh morning air through which the *savans* had made their way, the chair was taken by the President, the Rev W. S. Symonds, rector of Pendock.

The names of several gentlemen having been announced as candidates, the members proceeded to adjourn to the fields. A Botanical party, headed by Mr.

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Purchas and Mr. Lingwood, then departed on an exploration of the vales of the Monnow and the Dwr, in the district of Rowlstone, Abbey Dore, Ewias Harold, and Kenderchurch, &c.; while the larger part of the party chose for the scene of a mixed botanical and geological ramble the valley of Kentchurch, Garway Hill, and Grosmont.

Passing along meadows dotted with orange flowers of the Hypochoeris radicata and the deep blue spikes of the Prunella, and fragrant with the perfume of the Plantago, the larger party of the members made their way by the footpath to Grosmont mill. In the coppice and hedge-rows on the way the elegant blossoms of the spreading bell-flower Campanula patula a characteristic plant of the district, and the noble Meadow Cranesbill which grows luxuriantly in the rich warm valley of the Monnow, attracted attention.

Crossing that river by the stout old bridge of the 14th century, which is associated by tradition with the mighty wizard, "John o' Kent" or "Gwent," the party proceeded up the beautiful bowered lane, between hedges purple with the Vicia Cracca, passing the Church and Court of Kentchurch, and making their way to the sandstone quarries on the slopes of Garway hill. Thence they mounted to the summit of the hill; and there, as they rested from the fatigues of the ascent, enjoyed for a while the glorious panoramic view, embracing at a glance all Herefordshire, with portions of the counties of Worcester, Salop, Radnor, Brecon, Monmouth, and Gloucester, the blue hills of Wiltshire closing in the view to the S.W.

Shortly before 2 p.m. the party left the peak of Garway, and made their way down towards the Cornstone and other quarries situated in the woods of Kentchurch. On the way down the steep, they noticed the great profusion wherewith the beautiful mountain fern, Aspidium Oreopteris, clothes the mountain sides, as if to shelter the abundance of Hare-bells (Campanula rotundifolia), Hawk's-beard (Crepis virens) and Tormentilla vulgaris. It was noticed, however, as remarkable, that not a single plant of the Sheep's-bit, Jasione montana, so common upon lofty hills in other parts of the district, was observed throughout the day.

On reaching one of the quarries the Geologists were interested in discovering, on a piece of Old Red Sandstone, a remarkable impression of vegetation—apparently the stem of a tree. At the same spot, the Botanists were gratified to find the somewhat rare and very pretty little orchideous plant called Lady's-tresses, Spiranthes autumnalis. Among the Cornstones very many remains more or less perfect of the Cephalaspis, the shield-headed fish of the Old Red Seas, were found. In threading the by-paths of the woods towards the river bank one of the botanists was fortunate enough to light upon a plant of the broadleaved Helleborine, Epipactis latifolia, in full flower.

Having crossed the Monnow by the picturesque but shaky footbridge, the party directed their steps towards Grosmont. The examination of the majestic old Castle, with its massive semi-circular keep, and the beautiful tall chimney of its banqueting hall, occupied a pleasant half hour. The party subsequently visited the interesting old Church, the beautiful chancel of which—along with the Castle,

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strangely overlooked in the explorations of the British Archaeological Association last week—is remarkable for the fine rows of Early-English windows, connected by dripstones, inferior in size only to the noble range of similar windows in Christ's College Church at Brecon, upon which so much admiration was deservedly bestowed at the meeting of the Cambrian Archaeological Association last year. A very good carved piscina of the 14th century; the rudely carved stone brackets which once supported the Rood Screen; the curious Elizabethan tombstones near the Communion rails; and the noble aspect of the nave and aisles—a miniature cathedral effect—were also observed.

Giving a passing glance to the stone table of the 15th century in the market hall with its edge carved with quatre-foils, which Mr. Clayton, architect, who was present considered to have been removed from the Castle—the party proceeded towards Monmouth Cap Inn. The heaps of Cornstones along the roadside, which were found to be rich in remains of the Cephalaspis, were subjected to but a cursory examination, owing to the fact that the hour for another duty was fast approaching. Even naturalists must dine, if they are to contiune their studies afterwards with the agreeable reflection that body and mind have received their due share of attention.

Accordingly, at 5 p.m., the party assembled at the inn to partake of an excellently served dinner the provision of which in the opinion of the guests, was decidedly a "feather in Mrs. Dew's (Monmouth) Cap." The Rev. W. S. Symonds presided, the Vice-chair being filled by Mr. Suter, Hon. Secretary of the Club; and there were also present the Rev. T. T. Lewis, rector of Bridstow; the Rev. W. H. Thackwell, of Birtsmorton; Rev. T. H. Hill, of Felton; Rev. J. F. Crouch, Pembridge; Mr. Edwin Lees, F.L.S., Worcester (author of "the Botanical Looker-out," the "Geology and Botany of Malvern," &c.); Mr. Baxter, of Worcester, Mr. Clayton, Architect (author of "The Timber Halls of England,"); Mr. Lingwood, F.R.C.S., Mr. Purchas, Mr. Cam, Mr. Clark (Abergavenny), Mr. T. T. Davies, Senr., of Hereford, Mr. Ballard, Mr. Arthur Thompson, Mr. Flavell Edmunds, and others.

The health of the Queen having been given and duly received; the Chairman then rose and said,—Gentlemen, the last of our pleasant excursions of this season is quickly drawing to a close, but altogether I think we may congratulate ourselves upon a tolerably satisfactory career. As Geologists, we are now enabled to record the discovery of a fossiliferous district of the Old Red Sandstone in the neighbourhood of Leominster, while as Botanists, the detection of the marine grass, Gastridium lendigerum, by Mr. Davies, at Breinton near Hereford, is of considerable interest.

With regard to the first discovery, I cannot too strongly impress upon my brother Geologists whe live in the neighbourhood of Ludlow and Leominster, the importance of collecting the fossils of the quarry of Leysters' Pole.*

On the left hand side of the road going from Leominster to Tenbury, before arrival at Leysters' Pole, is a row of cottages called Quarry Cottages, at the back of which is an old quarry, for many years disused. In the parish of Leysters, situated on the Church Farm, near the Poet Wordsworth's Stone, there is another quarry. It is probably the first of these two quarries to which the Rev. Wm. Symonds here refers.—*Editor.*

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We have now had unequivocal proof of the existence of numerous fossil fish in the Cornstone group of the Old Red Sandstone of Herefordshire, for twenty or thirty specimens were disinterred under our own observation, by the members of this Society, in our last expedition to Leominster; I cannot doubt therefore, that, through the aid of the intelligent naturalists of that part of the county, we shall, before another season has passed, be enabled to show such a suite of specimens as would delight the eyes of Hugh Miller himself; while by collecting these ancient organisms, and sending them to some good palæontologist—Mr. Salter, for instance—for comparison with the Scotch ichthyolites, we may hope to add something to the development of that analogy which exists between the Old Red Sandstone groups of Scotland and Herefordshire.

There is one circumstance, as President of your Society, which has given me especial pleasure this day, and that is the kind and friendly manner in which the well known botanists of Worcester have came forward to assist the Woolhope Club in our kindred pursuits. These gentlemen have set us an example we shall do well to remember in the cause of good feeling and scientific research; and if the naturalists of Herefordshire have at any time been inclined to flag in their own efforts, let them call to mind that our Worcestershire friends have travelled fifty miles to be present at our exploration this day. This is not the first time I have had occasion to notice in public the untiring assiduity of the botanists of Worcestershire; but as the tale may be new to many brother naturalists on this side of the Malverns I may be excused if I once again refer to the history.

There is on the eastern flat below the Malvern Hills, a tract of land called Longdon Marsh, celebrated as the habitat of several peculiar plants, as well as for having been, within a recent geological period, a backwater of the marine estuary of the Severn. The botanist gathers there Scirpus maritimus, Cnicus palustris, and Lathyrus palustris, also the elegant Butomus umbellatus, or Flowering rush. This marsh is I believe the only locality in Worcestershire for the Lathyrus palustris; and it was during one of the rambles of the Malvern Club last season that Mr. Lees and Mr. Thackwell gathered some fine specimens in full blossom. Well, gentlemen, this capture was recorded in the *Worcester Herald*, and I believe, on the very day after the publication of that report, four of these ardent botanists posted from Worcester to Upton-on-Severn, and walked all day in pouring rain up to their knees in Longdon Marsh. Alas however sometimes for botanical as well as for other human projects, they did not find the Marsh vetch.

Yet another botanical episode attaches to this delicate flower. Soon after this expedition from Worcester, there was at Malvern a large and fashionable flower show; a great marquee was filled with the choicest and most gorgeous plants of the neighbouring conservatories, and my friend Mr. Thompson of Worcester was appointed the judge of the wild flowers that competed for Mr. Dyson's prize. In a sodawater bottle, filled with water from its native haunt, amongst the simple tenants of the wood and mead and mountain, was a little metallic looking pea that so excited the ardour of our worthy friends that perhaps no single flower at all that "gay and brillant throng" excited more interest,

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notwithstanding its humble guise and lowly companions, than the Lathyrus palustris of the Longdon Marsh.

Now nothing is more true than that the perusal of one volume of Natural History leads to the perusal of another; and it would be strange if, surrounded by such excitement and example, I for one did not plead guilty to enlisting as a humble recruit in the service of the botanist. For many years the study of geology occupied most of my leisure hours, but now I often find myself making long rambles merely in search of plants. I mention this not I trust egotistically, but as an instance of the advantage that accrues to us all from being thrown in contact with others who have cultivated those branches of Natural History of which we ourselves are altogether ignorant; and if no other good arises from the establishment of these Societies, we may surely point to some amongst us who have been induced to turn over many a page of Nature's works, hitherto unregarded and unknown, simply from having the right hand of fellowship held out to us by those who are more advanced in knowledge than ourselves. One word with regard to the future prosperity and meetings of this Society, and I have done. In the eloquent words of the author of the "Botanical Looker-out," "Flowers may fade, and summer days may wane, but the wreath we gather is a perennial one, that will revive month after month and in after years," and thus may it be with us. Our investigations for this season have come to a close, but I trust that another spring will find us prepared for future rambles and social intercourse, and that many a hillside and mountain grove and glen of Herefordshire will yet re-echo to the friendly argument, and at least innocent mirth of the friends and members of the Woolhope Club. (Applause).

The Chairman subsequently gave—prefacing it by some complimentary remarks—the health of Mr. Lees, Mr. Baxter, and the Worcester Naturalists. Mr. Edwin Lees, F.L.S., said that on the part of Mr. Baxter and himself, he thanked them for their kindness and warmhearted welcome, though he thought the President was rather hard in thus calling upon him to make sport or to show it, when he himself came to find it at his friends' invitation. He could, however, if he pleased, at once put in a demurrer which would fully excuse him from any speech-making on that occasion; for, as the President well knew, his voice was in another county, and as a Worcestershire man he had no "locus standi" in Herefordshire. But he must admit that they had one claim upon him, and that he must answer for—from his strong botanical hold of the Malvern Hills, he had made frequent incursions into the Silurian valleys; and the Worcester botanists, when pouncing upon and appropriating rare plants to themselves, had not been careful to enquire whether they were really within the county of Hereford. His friend Mr. Purchas whom he had now in his view, and who was collecting materials for a Herefordshire Flora, knowing his predatory success in this way and willing to make reprisals, had proposed to draw a line within which their respective operations should be confined; but he (Mr. Lees) found the pleasure of trespassing upon the Hereford border too great to be withstood and so, in accordance with a system which was found to work well,—at least on one side—he had declined to give up anything.

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To revert to the occasion that had brought them together, he felt that the effect of Clubs like these was not merely a pleasurable acquaintance with external nature, but of importance in giving a zest to investigation, and by friendly council together removing the difficulties that frequently arose. The invitation to members of other clubs too was a most desirable thing, which he trusted would be followed in other places; for not only did it give an opportunity of forming friendships, but it warmed the mind with emulation, and raised an enthusiasm, without which every pursuit became in time flat and unprofitable.

In the present day it must be admitted that the cultivators of natural history were rather different from their predecessors, who a couple of centuries ago were mostly lean apothecaries with great buckled shoes, whose ideas scarcely penetrated farther than the stuffed alligator or cockatrice's egg which dangled from their ceilings; while the pretty stones on their shelves, which they called "petrifactions," had nothing to do in their estimation with the organic life that had been, but the shells and fossils contained in the rocks they considered to be mere "sports of nature," made in a playful or experimental mood during her apprenticeship, in accordance with the fanciful idea of Burns:—

"On man she tried her 'prentice hand,
And then she made the lasses, O."

(Laughter). Even in the time of Charles II., just before the Institution of the Royal Society, we should have a mean estimation of the pursuits of philosophers if we judged them from what Butler alleges in "Hudibras," that instead of classifying great rock formations they employed themselves in considering

"What figured slates are best to make
On watery surface duck and drake."

And the same author represents their studies as being merely notices of wonder to gape at—

"Of men that walked when they were dead,
And cows of monsters brought to bed;
Of hailstones, big as pullet's eggs,
And puppies whelped with twice four legs."

Surely in the present day our observations have got to a point in advance of this. Formerly theory and speculation were advanced in the most ridiculous manner without any sufficient data, and humble untiring but invaluable observation was comparatively neglected. Even in the times of the Grecian philosophers, to whom we were accustomed to look up with such respect, the mere fancies of sages were held to be true, and materially retarded the advance of knowledge. Plato considered all our knowledge as derived from the mere recollection of what we had known in a former state, and Socrates advocated the same thing. But such nonsensical dreams had only the effect of restricting and impeding the advance of observation. But in the present age of observation and research, none of these deceptive corks were allowed to buoy us up on the service of the broad river

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of science—if we could not swim without them, down we must go; and no theory, however plausible, no attempted working up of the monkey into the man, and after a Monboddo of La Marqueian fashion lopping off his tail to make a reasonable being of him, no mere vestigian dreams will now enable us to take rank in science, instead of ourselves by patient effort moulding the ethereal figure that must give life and spirit to the shapeless marble. Hence, observed Mr. Lees, I hail the numerous Clubs and associations devoted to the study of natural history now springing up on every side and in every county, because they all inculcate observation and instigate research. As they rouse us from the slumbers of vacuity and call upon us to exert our faculties in some useful way, so they all offer us agreeable occupation, from the Entomologist seeking for the earth-born insect, through every hall and colonnade of scientific study, till we reach the terminal escarpment of native rock, where the geologist leads us down the stone steps of the palaeozoic crypt, where amidst the shadows of past ages all traces of organic life are lost amidst igneous agency and chaotic confusion.

Yet notwithstanding the pleasure we derive from that intercourse of emulation that brightened up all our faculties, from the meetings that led us into communion with nature in picturesque localities, by babbling streams, rocky precipices, and Dryadean shades, how often was it asked us—what could there be in plants and fossils so fascinating and interesting as to induce us to take long journeys and endure such fatigues in quest of them? Or what adequate remuneration was obtained? Why, what limited ideas such questions must have—for it might just as well be asked what benefit resulted from any mental pursuit or even recreation; what indeed was the use of eating and drinking? It was admitted that they must all eat and drink to live, to enable the body to carry the soul; and then the soul required that superior aliment that was fitted to sustain its intellectual powers. The mind of man was always sighing for something to do, or to explore some fresh field of discovery; Lucretius had observed ages ago that—

"Twas sweet to cull new flowers";

and in the various fields that nature stretched before our eager view, there was always something to learn, and the hope of novelty was a continual spur to effort.

The illimitable universe of enquiry was constantly expanding before our view, and accompanied by the pilot of faithful observation such excursions would add to our stock of knowledge, so that we not only made pleasant paths for ourselves, but left a beaten track that could be made use of by our successors in the same delightful studies.

Thanking them again for their kind welcome, and feeling the importance of Associations that thus brought observers together in the field, he would conclude by proposing—Prosperity to the Woolhope Naturalists' Field Club. (Applause). Mr. T. Baxter (from Worcester) also briefly acknowledged the compliment paid to the Worcester Naturalists.

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THE DRIFT OF HEREFORDSHIRE.

A brief conversation on this subject was originated by Mr. Edmunds observing that during the last twelve months he had, along with his friend Mr. T. T. Davies, devoted some little attention to an examination of the nature of the Drift in the neighbourhood of Hereford; and he found it to consist of two beds. The upper, or surface drift, is composed principally of fragments of the green and red beds of the Old Red Sandstone, intermingled with quartz pebbles, all evidently water-worn, and not of any great size. Below this bed, at an average depth of some three or four feet—in some cases rather more—is an extensive deposit of larger fragments. Among these he had found felspar, pure or in conjunction with portions of trap and of rocks of aqueous origin; with clayslate, Lydian stone, greenstone, grey Cambrian rocks, and quartz boulders.

The recent works in the excavation for the Railway station at the Above-Eign, Hereford, had laid bare a very extensive deposit of this larger drift, which had been used on the line as ballast or gravel. Upon the Ross and Gloucester line, between Dinedor Court and Holme Lacy, the deep cutting had been driven through another deposit of the same character, the fragments of which had been used upon that line also as gravel. He had not observed any drift of a similar character beyond the limits of the valley of the Wye.

Along the Lugg the drift is Old Red, mixed with Silurian rocks; he had seen, for instance, in the possession of their fellow-member, Mr. Ballard, a good speciment of chain-coral, much water worn, which had been taken from the bed of the Lugg. Along the Monnow, he had noticed the drift to be chiefly fragments of Old Red, with the quartz pebbles universal in the district. In the Wye, on the contrary, the pebbles were fragments of various rocks represented in the lower drift-bed, only much smaller and more water-worn, mingled with a portion of the surface-drift. He wished to know whether the experience of other members of the Club, in regard to the same or other districts of the county, corroborated his own.

The Rev. T. T. Lewis remarked that the subject of the Drift was one of very great interest to geologists, and one upon which all the observation possible might with advantage be brought to bear. Sir Roderick Murchison had investigated it very carefully, and is still pursuing his investigations. The explanation of the phenomena involved a great many considerations. The distances to which fragments have been transported by water from the nearest beds to which they could have belonged are very great. For instance he had received a fossil of the Upper Ludlow rocks, the Gryphaea incurva, from his friend, Mr. Lingwood, which he understood to have been picked out of the river-bed near Ross. If the fact could be substantiated it would be very interesting as an illustration.

Mr. Lingwood said the fragment had been brought to him by a man who told him that he picked it out of the river, and he knew no reason to doubt the veracity of the man.

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Mr. Baxter observed that Silurian fossils had been found in the bed of the Severn at Worcester.

Mr. Lewis remarked that the River Teme which drains the Ludlow district, falls into the Severn at Worcester, and probably the Silurian fragments had been brought down by that tributary.

Mr. T. T. Davies remarked that he had long felt a great interest in the inquiry, and about twelve months ago, when returning from the meeting of the Cambrian Archaeological Society at Brecon, he had, in conjunction with his friend, Mr. Edmunds, examined pretty closely the drift in the neighbourhood of the igneous ranges which cross the river near Builth. At Dol-fach, in particular, they found an immense quantity of the fragments of the rocks mentioned by Mr. Edmunds as occurring in the lower drift about Hereford. They then traced the drift to its termination, which was upon the side of a hill of Upper Ludlow rock, the strata of which they noticed to become gradually tilted until they became vertical.

Mr. Edmunds wished to add a single remark: he had not only found the lower drift at Hereford to be identical with that at Builth, which latter had been washed out of the subsoil by the floods of July, 1853; but he also noticed that the size of the fragments gradually diminished from Builth downwards to Hereford. Among the fragments found at Dol-fach he remembered Mr. Davies calling his attention to a piece of basaltic column more than a foot long, and seven or eight inches broad, the crystalline form of which was fully preserved, as far as a shaving—so to speak—of about an inch thick could preserve the form of a column.

Mr. Lewis had no doubt that such fragments would be readily found in the vicinity of Builth.

The Chairman felt much obliged to Mr. Edmunds for having brought forward the subject, which was a very interesting one. Individual observation by the members, and the communication of the result at the meetings, was the only mode by which the Club could fulfil its object in the investigation of the Natural History of the County.

A New Plant found in Herefordshire.

The allusion of the benefit of individual observation in the advancement of scientific knowledge elicited from Mr. Lees a fact interesting to the botanists of this and neighbouring counties.

Mr. Lees observed that there was a circumstance recently come to his knowledge, which would doubtless be interesting to the Club, and which he thought deserved notice in their records. This was the discovery of a plant in Herefordshire, entirely new to the Flora of Britain. The plant was an orchideous one, growing in very shady places, the Satyrium Epipogium of Linnaeus, but by the modern botanists denominated Epipogum aphyllum. It had been found within the last three weeks by a lady botanist, Mrs. Smith of Tedstone Rectory, in the parish of Tedstone Delamere near Bromyard, and he was obliged to confess that he was here vanquished by a lady, as he had himself botanised on the same spot with the Rev.

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Dr. Cradock, the President of the Worcestershire Club, and lately the Rector of Tedstone, without finding the plant. This showed that the field of observation was never exhausted, and he hoped that their friend Mr. Purchas, now working up the plants of Herefordshire, would take the hint thus given him, and emulate Mrs. Smith by introducing some plant at present unknown to the county of Hereford to their notice next year. To give him encouragement in the wide field he had to observe, he would beg to propose the health of Mr. Purchas, and success to his botanical labours. (Applause).

Mr. Purchas, in acknowledging the compliment paid to him, expressed the obligation under which he and the Herefordshire botanists felt to Mr. Lees and the Worcestershire botanists for having crossed the boundary, and made what might be called an inroad into this county. In preparing the Flora of Herefordshire, a work which is in progress, he felt that the labours of Mr. Lees would in that respect be of very great assistance. With reference to that part of the county which lies near the Malvern Hills, to which the labours of Mr. Lees had extended, the work could not possibly have been better done.

The health of Mr. R. M. Lingwood, the first President of the Club, was then given, and neatly acknowledged.

This toast was followed by the health of the Rev. T. T. Lewis, the President of the last year, whose researches laid the foundation for the elaborate investigation of the Silurian rocks by Sir Frederick Murchison. The Rev. Mr. Lewis suitably returned thanks.

The party rose from the table about 8.30 p.m.; and the Hereford members departed from Pontrilas station. Through the kindness of Mr. Leyland, the traffic manager, a carriage had been appended to the luggage train which was ordered to stop at Pontrilas for the purpose of taking up the party, who reached Hereford about 10 p.m., much gratified by their last field meeting for 1854.

Plants Gathered during the Day.

Although no plants were found which could be termed new to the county, yet during the day many of the rarer plants of the district were met with.

Epipaetis latifolia—Broad-leaved Helleborine.
Spiranthes autumnalis—Lady's tresses.
Gentiana Amarella—Autumnal Gentian.
Ranunculus hirsutus—Hairy Crowfoot.
Sinapis nigra—Black Mustard.
Reseda Luteola—Weld.
Geranium pratense—Meadow or Blue Cranesbill.
Vicia tetrasperma—4-seeded tare.
Rosa villosa—Downy Rose.
—— micrantha—Small-flowered Sweetbriar.
Epilobium roseum—Rosy Willowherb.
———— angustifolium—Rosebay Willowherb.
Carex strigosa—Wood Carex.

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Sison Amomum—Bastard Stone-Parsley or Hedge Stonewort.
Torilis infesta—Spreading Hedge-Parsley.
Petroselinum segetum—Corn-Parsley.
Dipsacus sylvestris—Wood Teazle.
Lactuca muralis—Wall Lettuce.
Cichorium intybus—Chicory.
Erigeron acris—Blue Fleabane.
Achillea ptarmica—Sneezewort.
Chlora perfoliata—Yellow-wort.
Linaria minor—Small Toadflax.
——— elatine—Sharp-pointed Fluellin.
Mentha sylvestris—Horsemint.
Calamintha officinalis—Common Calamint.
Lysimachia nummularia—Herb Twopence.

RUBI (brambles).

Rubus tenui-armatus, R. scaber, R. amplexicaulis, R. Koeleri, R. rhamnifolius, &c.

COLLECTION OF WILD PLANTS.

EXHIBITION OF THE HEREFORDSHIRE HORTICULTURAL SOCIETY, SEPT. 12TH, 1854.

The Special Prize (a gold pencil case) which was offered by the members of the Woolhope Naturalists' Field Club for the best Herbarium of Herefordshire Wild Flowers, brought only one competitor to the show—The Rev. Thomas Hutchinson, of Kimbolton. The Rev. gentleman's Herbarium consisted of about 350 plants, beautifully pressed and mostly consisting of rarer specimens found in the district where he resides. They were arranged according to the natural system; but the Linnaean classes and orders were not appended, according to the usual custom, with the Herbaria sent in. The plants were fine and characteristic specimens

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JOINT MEETING OF NATURALISTS AT WORCESTER.

The date of this meeting was probably on Tuesday, October 10th. The report below is taken from the *Hereford Times*, of October 21st, 1854.

A joint meeting of the members of the Worcestershire Natural History Society, and the Woolhope, Cotteswold, and Malvern Field Clubs, was held at Worcester, on Tuesday sennight. The Lord Bishop of Worcester presided, and there were present of the Woolhope Club—Rev. W. S. Symonds, President; Mr. J. A. Suter, Hon. Secretary, Rev. J. F. Crouch, Dr. Gilliland, Mr. A. Thompson, and other members.

Professor Phillips, of Oxford, delivered an interesting and instructive lecture. He observed (we quote the report of the *Worcester Herald*) that the Malvern Hills formed one of the most beautiful and singular ranges of mountains in the world, owing to the antique character of their strata, which were situated in the midst of a magnificent modern garden, both westward and eastward. Looking from the summit of that range, they might behold two of the oldest creations in the world, and were between two totally distinct systems of life. And, still more wonderful, there was not one species of organic beings in either of those two systems, the counterpart of which was at the present time existing on the globe. Looking westward would be found the tombs of an immense group of vanished life. Eastward, in the direction of Gloucestershire and the Cotteswold Hills, the Saurian and other reptilian remains, shells, &c., proclaimed another ancient system of life, every species of which, on being compared with living types, was found to be extinct. These two ancient forms, therefore, were not only totally distinct from each other, but from all species now existing. This was a marvellous thing in so narrow a range; and surely such a fact would prevent people from beating the Malvern Hills to pieces, without at least recording what they saw during the operation. When it was found that a difference in temperature, food, and other physical circumstances, occasioned the forms of life to be widely varied—as, for instance, in the phenomena of Australia compared with Europe—those variations were not so startling when the countries put into comparision were as wide apart as one-half the circumference of the globe; but that was not the case with the Malvern district. Looking on nature with philosophical eyes, it must be perceived that the whole was a manifestation of infinitely wise and predetermined plans, where everything had been calculated for, and where every existing thing had been placed amid circumstances which had been prepared for its existence. Then these forms of life differed in proportion as the physical circumstances of life varied. Well, then, on one side of the Malvern Hills were the evidences of one set of physical circumstances, and on the other side a totally distinct set. There were two distinct periods of time, marked by two distinct strata of rocks. On inquiring further into this subject it would be found that the surface of the earth, for the most part, had once formed the bed of a primeval ocean, and that it had been at successive periods covered over by strata con-

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taining the remains of animal and vegetable life, differing according to the times and physical circumstances under which they had existed.

He then described the Palæozoic, the Mesozoic, and the Tertiary systems, expatiating on the infinitude of ancient forms of life left close to our hand for study, also remarking on the submerging of portions of the earth's crust which once were dry land, and the existence of ancient forests to an extent which defied all calculation, as proved by the immense beds of coal in various quarters of the globe.

The question then forced itself upon our consideration as to what could have been the conditions of nature under which these changes of life had taken place, and he proceeded to speak at some length on the nature of those changes. The most ancient stratification on the west side of the Malvern Hills exhibited no traces of mammals or of birds, and but few of fishes; and he pointed out, by means of a diagram chalked on a board, the lowest strata, in which no signs of life were visible (directing his hearers to the middle part of the Malvern range for a specimen of this stratum), progressing upwards to the upper Silurian system, where life abounded in various forms, and next to the famous "Old Red," deposited just above the Silurian field.

He spoke of the great researches of Sir R. Murchison in this branch of science, the result of which proved that, in whatever part of the world the same kinds of strata were met with, precisely similar features were apparent in them—namely, the non-existence of life in the lower region, and its gradual increase and development in superincumbent layers. It was a subject of anxious enquiry as to how and why these ancient specimens differed so specifically from now existing plants and animals; but he would here remark, that they were not found to differ in such a manner as to prove that they had belonged to an entirely different creation, or to a Providential plan not in harmony with that under which we ourselves lived; for we might readily infer, from existing species, the character and habits of extinct ones. Nature herein was one great book, and in her pages were clearly recorded the various changes through which the system had passed. We might interpret the most ancient things by those still existing; for instance, the Lingula had been found in the earliest formations and likewise in the latest. But this was not so with all other species—the Trilobites for one class, not being now in existence. On the west side of the Malvern Hills, in the Palæozoic strata, Trilobites might be found, and they were never found but in that strata in any part of the world. Indeed, the specimens of Trilobites were a sort of coin, struck in the Palæozoic age of the world, just as the Belemnites indicated the Mesozoic period.

Now the knowledge of geological phenomena was decidedly necessary for practical life as he showed by the futile attempts which had been made (especially in the neighbourhood of Northampton) to obtain coal by sinking into strata where that article could not possibly have been deposited; and he censured the evident contempt shown to geological science by parties who had preferred in such cases the advice of comparative ignorant men to that of scientific geologists. Their failures were a fit reward for such short-sighted conduct.

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The Professor then went on to describe the various strata on the west of the Malvern Hills from the lowest point where life was absent—then its first appearing, taking his hearers up through the prolific Silurian bed, where a very large development of life had taken place. The remains of fishes were found for the first time about half way up that bed. But when they came to the next formation—the Old Red Sandstone—there was a total change of deposits. Very few traces of life appeared there, and even those appeared to have been drifted. Although the Old Red was many thousand feet in thickness, it contained but about a dozen specimens of life, and those embraced a few fishes which totally differed from the strata both above and below it. Some attributed these changes to great convulsions, but he was not inclined to that theory when he compared the inclinations of ancient strata with those of the more modern. There had been, no doubt, phenomena effecting these changes in physical condition which formed the present problem in geology. Some believed the earth had undergone a general change in the quality of its atmosphere; but though there was reason to believe this, yet it would not account for the whole of the phenomena presented.

He alluded to the astonishing masses of coal in the crust of the earth as a proof of the ancient existence of a wonderful vegetation. Plants lived on air, which gave them their solid substances; they extracted carbonic acid from the air, fixed it as carbon, and ultimately become coal. Hence the atmosphere must have become considerably modified by such an immense abstraction, and vegetation itself dwindled as the means from which it derived nutrition became less and less. This carbonic acid was essential to plants, but unfavourable to animals which breathed the air directly. Therefore no such air-breathing animals were found older than the coal formations, excepting one description of lizard in the Old Red of Scotland, a little land shell, and one or two other specimens.

The Professor went on to explode the theory of those imaginative naturalists who affirmed that all the species of living things were capable of gradual changes, whereby they passed into other forms, and that geological strata exhibited a series of these easy and gradual changes from the oldest times till now. We might start with a shell, the inhabitants of which in the course of ages would aspire to the class of fishes, and not content with that, would go on to a bird, and ultimately join the mammalia tribes—and so an oyster might become a man. Given a form of life out of which anything might come, and of course everything might come. (Hear hear). But there was no basis for that absurd theory. Had anything changed its form within the period of man's existence or knowledge of the earth? Sepulchred in Egyptian soil was found the mummied Ibis as it was 3,000 or 4,000 years ago, and the Crocodile of those days agreed with its modern representative on the banks of the Nile. Nothing, indeed, within our experience, justified the suspicion that even plants changed their forms; nor, in fact, that any one specific form of life ever varied so as to represent others.

The lecturer then returned to the Malvern Hills, to show how they illustrated the succession of life, and particularly alluded to a description of Black Shales found on a part of those hills, which some had mistaken for coal. He had in-

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vestigated those shales, and discovered in them small Trilobites, about the size of pin's heads or peas. These Trilobites had never been seen in England before, and were only known in Scandinavia; and he strongly recommended students to patiently examine the shales, as it might lead to results of great interest.

The next prominent point in the address was an allusion to Haffield Hill, near Malvern, which was pronounced to be a curious conglomerate of materials brought together from various distant parts, some of its pebbles being supposed to have drifted from Shrewsbury. Professor Ramsay's startling theory, founded on the scratched appearance of certain stones and pebbles, was that those rubbings and indentations were occasioned by icebergs passing over the rocks, and hence the Haffield conglomerate might be an evidence of glaciers and icebergs at a remote period. This theory was the more startling from the fact that the appearance of plants and animals just before the period of that conglomerate indicated a very warm if not a tropical climate! It was a fact, however, that no pebbles on the sea-shore were ever seen to be so scratched or rubbed, and that in Switzerland and other mountainous countries, where glaciers existed, the rocks were invariably scratched. He, therefore, recommended a careful examination of the stones at Haffield, to ascertain whether similar traces existed.

In conclusion, the Professor strongly urged all persons belonging to field-clubs not selfishly to retain the specimens they gathered, but to deposit them where they might be of use to their fellow-explorers; and above all, he advocated the formation of an entirely local Museum at Malvern. Such an institution there would prove of the utmost value; but he cautioned them, if such a museum were established, to decline accepting any specimens whatever that did not actually belong to their own district. There was no reason why the British Museum should swallow up all the provincial institutions, and a district so exceedingly rich as Malvern ought to have one of its own; for if they sent their specimens to London they would be lost in the immense collection there, whereas, if deposited at Malvern, geologists could go there and study them with advantage. For the same reasons a local publication should be established at Malvern, devoted to the purposes of natural history.

The learned Professor's address was listened to with great attention and rewarded by much applause, and a unanimous vote of thanks was moved by Sir P. Egerton and seconded by Canon Cocks.

Dr. Wright, of Cheltenham, then made a short communication as a member of the Cotteswold Club, to show how much benefit science derived from naturalists steadily working out the details of their own respective localities.

An interesting letter from Sir R. Murchison, who was absent owing to illness, was read. Sir Roderick observed:—

"In reference to the classification of the upper Silurian rocks, my most efficient assistant was my valued friend, the Rev. T. T. Lewis, of Aymestrey. That gifted but modest individual first obtained the true key to the subdivision of those rocks, and he was also the first who made known to me that the black limestone of Sedgley must be the same as his own Aymestrey rock.

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"It did indeed give me entire satisfaction, at the late meeting of the British Association at Liverpool, to point out a flagstone of the Old Red Sandstone, on the surface of which Mr. Lewis had detected the trails of animals—some of them apparently made by crustaceans, others by mollusks. Sterile as the Old Red Sandstone has hitherto been in affording any traces of fossil remains except those of fishes, this one fact, discovered at Puddlestone, near Leominster, leads us to believe that there must have been an ebb and flow on the surfaces of the Red rock, and no deep sea, just as we have numerous other evidences of shallow and shelving shores, where the Upper Ludlow rock, with its minute fishes, was accumulated.

"In the later years of my labours, I received solid and substantial aid from a lamented friend, whose name will never be pronounced in the City of Worcester without producing unequivocal signs of respect for his character, and admiration of his powers as a naturalist.

"Mr. Hugh Strickland was not only my associate in the field, in unravelling the order of the youngest Red formation beneath the Lias, and in proving it to be the equivalent of the German Keuper, but he executed a labour of love for me in compiling and arranging that copious and most perfect Index of the original "Silurian System."

"One of my last excursions with him was when he took me to see the exact position of the Black Schists, or the oldest fossil-bearing Silurian rocks, in the west flank of the Malverns (schists in which Professor Phillips first detected the Olenus), in which Mr. Strickland, with indomitable perseverance, had further detected the very minute crustacean Agnostus piriformis. These close observations are of the highest importance, for they unequivocally identify the Black Schists of the Malvern with the lowest zone in Sweden and Norway containing animal remains, viz., the Alum Slates. Now, in Scandinavia, where I have explored the Alum Slates, Black Schist is never of greater dimensions than in your Malvern Hills; they repose, as I have described, on a sandstone of much more considerable dimensions, in which fucoidal impressions and casts are alone discernible; and as Professor Phillips, in his inimitable description of the Malvern and Abberley Hills, has shown you that the Black Schists with crustaceans repose on a similar rock (Hollybush sandstone), you have, in my opinion, the very basis of all Silurian life within a short drive from the city of Worcester.

"Such, let me say, is the unhesitating opinion of the first of all authorities on the Schist, M. Barraude, who, seeing in your Malvern schists the very same species of the Agnostus as in Sweden and in his own primordial zone of Bohemia (also the base of Silurian life), has desired me to state his view publicly.

"In a brief letter I am not going to endeavour to show that all the Silurian formations, including my well-beloved rocks of Llandilo and Caradoc are adequately developed. I know that these members of the Lower Silurian, which, with their fossils, typify the group over wide continental regions, are only partially seen near you. But let me remind you that your Upper Silurian, from the Woolhope limestone to the Ludlow rock and Old Red inclusive, are as instruc-

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tively displayed along your Abberley and Malvern ranges as in any part of the British Isles! In vain will you seek for this beautiful sequence in any part of the continent of Europe, except partially in Bohemia.

"To that spot, and to the isles of Gothland and those of the Bay of Christiana, our British Upper Silurian is restricted. But there it is seen to be indissolubly connected with Lower Silurian rocks, full of fossils, and the strata occupying very small vertical dimensions.

"Excuse me for venturing, as a sick man, to say even these words on the analogy which your charming neighbourhood represents to that of other regions. Permit me, however, to express my true delight in seeing natural history in all its branches flourish so efficiently as it does in and around the City of Worcester, where my esteemed friend, Sir C. Hastings, is ever rendering aid with his fostering hand, and where the dignitaries of the neighbourhood are prompt in supporting it.

"When I read the names of so many friends, fellow-labourers, and associates, as are announced to be present to-morrow, you may well believe how truly I deplore my absence. Unable to stand forth on the part of my own dear Woolhope Club, let me congratulate you on having the Malvern Club represented by the Rev. W. Symonds, the Cotteswold Club by Lord Ducie, and the Worcestershire Club by the Rev. Dr. Cradock; and in respect to the first of these, as more immediately connected with myself, I owe a deep debt of gratitude to my zealous friend Mr. Symonds, for his lucid preparation of the Index of the work I now lay upon your table.

"When I was bold enough (16 years ago) to bring to the mind's eye of the geologist, and in a period long after all Silurian days, a powerful marine current running from the north and occupying the Straits of Malvern," as I then termed them, I little thought that I should live to see my friends from the opposite shores of former days—the Cotteswolds and the Malverns—now rivalling each other in their search after truth, and in meeting together to record their advances in this city, so ancient in the annals of our country, but which (the archæologist must not object to the phrase) was in one of the last geological epochs at the bottom of the sea!"

A resolution was next passed, on the motion of Sir C. Hastings, seconded by the Rev. J. Pearson, congratulating the meeting on the co-operation of the field-clubs; and after a vote of thanks to the Bishop, on the motion of Earl Ducie, seconded by Mr. Ricardo, M.P., the business of the meeting terminated. The members afterwards dined together.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING,

TUESDAY, JANUARY 23RD, 1855.

The Annual Meeting was held on Tuesday, January 23rd, in Hereford. The Rev. W. S. Symonds, Rector of Pendock, as the outgoing President, occupied the Chair at the opening of the business, and there were also present: Rev. T. T. Lewis, Rev. J. F. Crouch, Rev. T. Hutchinson, Dr. Bull, Mr. H. Salwey, (Ludlow), Mr. Hewett Wheatley, Mr. Suter, Hon. Sec., Mr. Flavell Edmunds, Mr. A. Thompson.

The Secretary read a statement of the accounts, from which it appeared that after purchasing a set of Meteorological Instruments, with which Mr. Wheatley has kindly consented to make a series of observations, there is still a handsome balance in hand.

The subject of printing a collection of the papers read at the Meetings of the Club having been discussed at some length, it was resolved that the address of the late President, the paper of Mr. Wheatley on the Salmonidæ, and a statement of the Botanical proceedings of the Club, be at once printed, so as to be ready for delivery to the members on or before the first Field Meeting, which is to take place in June next. The Chairman, on behalf of the Malvern Club, invited the members to meet that Club at Malvern in June.

The invitation was accepted, the fixing of the date being left to the Rev. W. S. Symonds, he being also President of the Malvern Club.

Dr. S. Steele and Mr. Clarke, of Abergavenny, were unanimously admitted members. Four other gentlemen were nominated.

It was resolved that, in future, non-payment of subscriptions for a period of three years shall exclude from membership.

The President delivered his address:—

ADDRESS DELIVERED JANUARY 23RD, 1855,

BY REV. W. S. SYMONDS, F.G.S., PRESIDENT.

GENTLEMEN,—Three summers have passed away since the Naturalists of the Woolhope Club met for the first time, on a May morning, at Tarrington, to explore that Silurian Valley of Elevations whence this Club takes its title. Since that period we have experienced the storm as well as the sunshine, and our little society has not been exempt from the vicissitudes which it is the lot of man while here below to meet with. The bust of our departed friend (the late Mackay Scobie, Esq., formerly Honorary Secretary to the Society), presented by those

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who knew his worth, as a token of regard to his widow (which even at this moment seems to watch over our proceedings), must ever remind this Society, when assembled in this room, of many pure and happy hours spent together in the investigation of God's Works!

We are now assembled together for the third time for our Winter Meeting, and to elect a new President. Allow me, then, without affectation or reserve, to thank you all cordially for the honour you have done me in calling me to the Chair during the past year, as well as for the courtesy and kindness with which my humble efforts have been received.

It has been the custom that the President should each year address at this meeting a short recapitulation of the proceedings of the Club; but as, at both our Leominster and Monmouth Cap Meetings, I went through much of our "sayings and doings," it would be perhaps more interesting if I address you to-day upon some occurrences which have since arisen, which affect the Woolhope Club in their character of Naturalists.

You will remember the paper I had the honour of reading upon the Old Red Sandstone, and the remarks I felt bound to make upon the wretched collection of fossils from that system, so characteristic of this county, obtained by our working geologists.

I then said "The practical value of a local collection depends chiefly upon the history of individual specimens. A fossil from the Old Red Sandstone of Herefordshire has a value far beyond any accident of fineness or rarity; it is illustrative of the history of the geology of our native county," . . . . and "I would rather see in Hereford an herbarium containing a good collection of Herefordshire plants, presented by one of the many good botanists the county can boast of, than all the foreign specimens of the British Museum."

You will call to mind the delight we experienced in finding, on our Leominster expedition, a true fish bed containing great numbers of the relics of those remarkable denizens of an ocean long since passed away, and rendered classical by the writings of Hugh Miller and Agassiz. I little thought at the time we were examining the plates and heads and tails of the Cephalaspides of Leysters Pole that, in a few weeks I should have the pleasure of making the acquaintance of the celebrated Scotch geologist, of examining in his cabinet the analogues of our Herefordshire fishes, and conversing with him on the similarity of the deposit, and the identity of the organic remains that occur in spots so far distant as the quarries of our native county and the north of Scotland. Most heartily do I thank the kind friend who afforded me the opportunity! Both Mr. Hugh Miller and Professor E. Forbes (alas, now no more!) were anxious that I should introduce our Herefordshire specimens to the notice of the many distinguished geologists assembled at the British Association for the advancement of Science at Liverpool, and I immediately wrote to our Honorary Secretary (Mr. Suter) to furnish me with all the specimens he could collect at so short a notice. He kindly and promptly acquiesced in my request, and I have to thank Mr. Suter, Mr. Barker, and Lord Ducie for the loan of those fossils which I had the honour of exhibiting.

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There is a distinguished botanist, who is also, I am happy to say, an active geologist, a member of our Club, who, since the meeting of the British Association, has found time and energy to follow up our discovery between Ludlow and Leominster—I allude to my friend Mr. Crouch, of Pembridge. This gentleman has managed to collect, in a few short months, the most valuable series of Cornstone fishes it has ever been my lot to examine, with the exceptions of those in Mr. Hugh Miller's cabinet. Sir Philip Egerton, the British ichthyologist, having kindly offered to examine any specimens I could forward, I sent him those belonging to Mr. Crouch, and they now lie on this table. Sir Philip, as you may see, has already determined three species of Cephalaspis from the quarries of Leysters Pole, all of which are identical with the Scotch organisms.

These fossil remains all appertain to the Cornstone, or middle group of the Old Red Sandstone. I would here revert shortly to those deposits as they occur in this immediate neighbourhood. Wherever in the Hereford district (of course, always excepting Silurian upthrows, such as Woolhope and Dormington Hills) you see verdant and wooded hill, there is the Cornstone formation, with its valleys denuded in the softer marls, and the hills made up of concretionary nodules and gritty sandstones. The fact that these hills have been preserved from destruction is owing to the hard impure limestone nodules of which they are composed. . . . . *

There is another branch of the science of Geology connected with our discoveries in the Old Red Sandstone, to which I would for a moment draw your attention. It is that of "Ichnology," or the history and study of the footsteps of animals, that untold ages ago walked on the shores of our Old Red Sandstone seas. This intricate and difficult witness in the courts of geologic record has in late years been put very closely to the question, and the Ichnology of Annandale, and the description of the footprints impressed upon the Bunter beds, is a work that will connect the name of Sir Wm. Jardine with the most difficult of geologic researches in modern times.

The Leominster meeting was not only remarkable for the discovery of a habitat of fossil fish; a distinguished geologist and former president of this Society (Rev. T. T. Lewis) bore away in triumph a large slab, bearing thereon the evidence not only of the ripple of the waves, but of an animal that had actually travelled over the sandy beach upon which those waves dashed.

This slab was brought forward by Sir Roderick Murchinson, at the meeting of the British Associations, and the footprints thereon were declared by those who have studied this branch ot the science, to be the traces of a crustacean.†

While speaking of a Palæozoic crustacean, I may recall to your memory the first discovery of the limbs of that remarkable Silurian "lobster" the "Pterygotus problematicus," by Mr. Scobie, which is described in the Geological Journal

* Here Mr. Symonds reverted to the remarks upon the Cornstones he made in his paper on "The Old Red Sandstone of Herefordshire," delivered at the meeting at Leominster, on July 18th, 1854, already printed a few pages antea. See page 117.—(*Editor*).

† This slab is to be seen in the Museum at Worcester.—(*Editor*).

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by Mr. Strickland and W. Salter. I give the passage at the commencement of Mr. Salter's paper *in extenso*.—

"The limbs of this interesting Silurian fossil not having hitherto been discovered, the present specimen is of considerable interest, as connecting it satisfactorily with the species so fully figured by Agassiz, which was obtained from the basement beds of the Old Red Sandstone of Forfarshire. But though of the same genus with the Scotch fossil, it presents characters that specifically differ." Not more than a fortnight since my attention was called to a collection of Upper Silurian fossils in the cabinet of Mr. Richard Banks of Kington, and on examining these specimens I found he possessed a large drawer full of the very fossils which palæontologists have so coveted to obtain. They were obtained from the "Tile stones" at the base of the Old Red Sandstone at Kington; and what with the feet, plates, and claws (one of which is even more perfect than the Hagley specimen) I believe that from Mr. Banks' collection an Owen or Agassiz would restore the Pterygotus, even as the Seraphim of the Scotch quarrymen stood forth, plate to plate restored, a monument of creation and design! Mr. Banks has kindly promised on the first opportunity to forward his fossils to Mr. Salter for examination and description.*

There is another point respecting the Pterygotus to which I would call the attention of geologists, and that is the great range of that animal as regards its period of existence. With the Downton beds how little of Silurian life remains! With the Tilestones it altogether disappears; and yet the remains of the Pterygotus occur in the upper Caradoc of Malvern.

The conclusion of Mr. Symonds' address contained a reproduction of his earnest requests in his paper on "the Old Red Sandstone of Herefordshire" that every one of us should lend a helping hand towards making the Hereford Museum a practical Institution of the county and neighbourhood of Hereford.

The concluding remarks will bear repetition:—Let me call upon you as lovers of Nature, to assist in the illustrations of the Natural History of your own county. Geologists, make the rocks ring and yield up their treasures! Botanists, many a specimen you carelessly throw away would be worth noting and recording! We may one and all, if we chose, come forth with friendly aid and render some good service towards the illustration of the Natural History of Herefordshire, the dear old country of the "Old Red Sandstone."

The thanks of the meeting were voted by acclamation to the Rev. W. S. Symonds, who consented to furnish a history of the Geological proceedings of

* "Together with the Pterygoti, Mr. Banks found fossils formerly confounded with the genus Cephalaspis Ag., but now separated. The species are new, but much like C. Lloydii Ag., hitherto known only in the overlying Old Red" (Journal Geological Society, Feb. 1, 1856, p. 23). "Himanopterus Banksii, a remarkable crustacean found by Mr. Banks, is described by Mr. Salter, page 32 of the same Journal.

An excellent engraving of "Leptocheles," or triple tail species of a Stomapod crustacean, in the possession of Mr. Lightbody, a member of the Woolhope Club, is engraved on plate 8 of the Edinburgh New Philosophical Journal, October, 1855.

The Club have to thank Mrs. Salwey, of Ludlow, for the drawing from which the engraving was executed.—W. S. S., March 2nd, 1855.

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the Club, to be appended to the Botanical history, and printed with the other documents already selected for that purpose.

On the suggestion of the Rev. W. S. Symonds, seconded by Dr. Bull, and supported by several other members, the Rev. J. F. Crouch, Vicar of Pembridge, an active and accomplished botanist, was elected President for the ensuing year, and took the Chair accordingly.

The Field Meetings were fixed: for June, at Malvern; for July, at Eardisley; and for August, at Ludlow. The subject of a bye-day to be devoted to a meeting at Bromyard, was discussed, but left for future consideration.

The Hon. Secretary was unanimously re-elected.

It was resolved that the prize (a gold pencil-case) for the best Herbarium of plants collected in Herefordshire during the year, be again given through the medium of the Herefordshire Horticultural Society, there being no restriction as to district.

After some further routine business had been disposed of, the following paper was read on

AN INCIDENT OF BOTANICAL HISTORY.

By Flavell Edmunds.

An incident in the botanical history of the district around Hereford, which may be useful as an indication of one of the kinds of service which I think our Club might with advantage render towards the advancement of the natural history of the county, forms the theme of this brief paper. I allude to the sudden appearance of certain plants in localities where, as my frequent previous examinations had convinced me, they had not grown for at least some years past.

In the course of last autumn, the embankments, spoil-heaps, and cuttings of the railways attracted my attention from the fact that one day at Widemarsh, I found a plant growing in the embankment of the diverted turn-pike road. I did not at first recognise it, as it merely showed its root-leaves, but on handling it, the peculiar smell left by the leaves recalled it to my recollection as *Hyoscyamus niger*, or common henbane. I then remembered that my friend, Dr. Bull, had told me some time ago that that plant occasionally made its appearance at Widemarsh, on any extensive stirring of the soil, but soon disappeared again. I at once carefully examined all the other embankments, and on the spoil-heaps near Widemarsh Mill I discovered no less than 40 other plants, none of which, however, had thrown up stems, or advanced much beyond the stage at which I found the first, although some of them were very luxuriant in root-leaves. I observed the plants carefully, visiting them several times a week until the winter set in, when, partly from the frost, and partly from the deposits of fresh heaps of earth, I suddenly lost sight of them. Perhaps the fact that I mentioned them to a druggist may have had something to do with the disappearance of the leaves at least. Next spring, perhaps, the plants may re-appear. The nearest spot

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to Widemarsh which I know to be the habitat of the Hyoscyamus is the lane at the foot of Backbury hill, which is about five-and-a-half miles from the scene of its sudden re-appearance last autumn.

In the course of my search upon the embankments, I obtained several other plants new to the locality. Of *Chrysanthemum segetum*, I gathered two specimens on the railway between the Above-Eign bridge and Widemarsh. The nearest habitats for it, as far as I am aware, are Sugwas Camp, 3 miles, and Clehonger, 4 miles distant.

In two places, viz., on the railway embankment near the locality of the last-mentioned plant, and at Widemarsh, I found very fine bushes of *Marrubium vulgare*, which I had not previously seen anywhere within five or six miles of the spot.

Lamium incisum is more common, but I had not previously seen it at Widemarsh, although I found it on the Breinton road, on the opposite side of Hereford.

Parthenium febrifuga, which is now growing freely on the slopes of the raised road over the Ross line, at Athelstan Hill, is another, and the last of these new-comers which I detected. Although common enough in some parts of the district, this is the first time I have seen it within some miles of its present habitat.

The cause to which I attribute this sudden appearance of plants fresh to the locality will be at once seen from the connection in which I have named them. The spoil-heaps and embankments consist wholly of earth dug out of the cuttings; and it appears to me that the seeds had been buried, for ages perhaps, below the reach of germinative influences. During their long entombment, by the mysterious power which vegetation possesses of suspending the vitality of the germ until circumstances are favourable for the development, the seeds had laid dormant. The instances of the germination of the mummy wheat, after an entombment of two or three thousand years, show to what long periods this state of dormancy may extend. Perhaps the plants, whose appearance amid the light of "upper earth" I thus record, may be the product of seeds entombed when our British forefathers fought an ever-honourable, if a losing, game against Ostorius and Agricola. It may be that the passing foot or the trailing spear of some painted Silurian, while hastening to the Camp on Dinedor or Backbury, struck against the parent plant, skaking off the seeds, which winds or waters speedily swept into some gully, where drifting silt, and the slower accumulations of successive ages covered it up, until the needs of the great civiliser Steam at length disentombed it from the prison of ages; another proof that, in this well-ordered frame, the work of the great Architectonicus—to borrow the term of the 17th century—nothing is lost.

I make no apology to my brother students of nature for recording at length what may be deemed so small a fact. It is by the accretion of small facts that soundest generalisations become possible. To those who do not share our love for the study of this wondrous world of nature which lies around us, I would quote this as another instance that even science has its poetical side. If my

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deductions be sound, two or three plants now living near our feet take us back direct, by a single leap, to the ages long past. I am quite aware that geology deals with periods to which these are but moments, and that the unregarded stone which mends our roads, or is rolled along by the current of the brook, is an antiquity before which the earliest works of man are mere novelties of yesterday. Botanical pursuits afford us no such grand visions of unrecorded time; but the little they furnish we may not the less thankfully receive. Facts like that which I thus venture to chronicle, show at any rate that botany, too, has its side of mystery—its hints of long-past days, its matter for the poet and the speculator, amid all the admitted dryness of its terminology and its descriptions.

In the conversation which followed, Mr. Symonds noticed the fact pointed out to him by Mr. Lees, of two fresh plants having made their appearance on a railway embankment in Worcestershire. The Rev. Mr. Lewis observed that the spoil-heaps of coal-pits were generally quickly covered with clover. The President remarked that if poppies had grown in a field, although it might be laid down in grass for fifty years afterwards, whenever again broken up, poppies would be sure to spring up. Mr. Edmunds had found two plants of Verbascum blattaria, last summer, in a road at Widemarsh. That plant is not common anywhere, he believed, and had certainly not been seen lately in the spot where he had found it. Dr. Bull observed that, about seven years ago, V. blattaria had made its appearance on the Abergavenny tram-road, and then as suddenly disappeared.

A hope was expressed that other members would furnish notices of incidents illustrating the natural history of the county.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, TUESDAY, JUNE 12TH, 1855.

WORCESTERSHIRE BEACON.

On Tuesday (12th June) the members of the Cotteswold (Gloucestershire), Woolhope (Herefordshire), and Malvern Clubs met at noon upon the summit of the Worcestershire Beacon, which had been chosen as the place where Sir Roderic Murchison would deliver a lecture on the Geology of the surrounding country, and Mr. Edwin Lees would also point out its principal features of interest in a botanical point of view. At this general rendezvous there could not have been less than 150 ladies and gentlemen. Amongst the latter were Sir Roderic Murchison, F.R.S., Sir Chas. Lyell, L. Horner, Esq., Rev. T. T. Lewis, Sir Chas. Hastings, M.D., Hon. and Rev. J. S. Cocks, Rev. W. S. Symonds, President of the Malvern Club, Rev. P. T. Brodie, Mr. C. Lingen, Professor Jas. Buckman, Dr. Wright, of Cheltenham, Dr. Grindrod, Rev. F. Dyson, Mr. W. Dowdeswell, Rev. J. F. Crouch, President of the Woolhope Club, Mr. P. Marriott, Mr. R. M. Lingwood, Rev. J. Pearson, Rev. W. L. Isaac, Mr. Edwin Lees, F.L.S., Messrs. Hewett Wheatley, Curtis Hayward, W. Burrow, Secretary of the Malvern Club, Rev. W. Thackwell, Rev. W. Thorne, Rev. D. Melville, Rev. — Taylor, Rev. T. Hutchinson, Mr. T. H. Lee Warner, Dr. Rootes, Mr. R. Johnson, Rev. S. P. Denning, Rev. G. Hodson, Captain Guise, Mr. S. Baker, Rev. F. Bayly, Dr. Guillemard, Rev. E. Bradley, Rev. C. Smith, Rev. C. Hill, Rev. W. A. Hill, Rev. A. Kent, Messrs. B. Maund, M. Curtler, M. M. B. Cooper, C. G. H. St. Pattrick, H. Sewell, W. C. West, R. P. Hill, Shipway, Glynn, Chambers, Fellowes, Smythe, Walker, P. Baylis, A. Thompson, R. Wheatley, H. Hill, J. Burrows, Preedy, &c., &c.

ADDRESS BY SIR R. MURCHISON.

Sir R. Murchison commenced his address by remarking that, surrounded as he was then by friends to whom he had himself been greatly indebted for the knowledge of this region, he could not but take this opportunity of acknowledging his obligations. Before him stood Mr. Horner, who had explored this part of the country before he (Sir Roderic) set foot in it; and there was also his intimate friend, Mr. Lewis, of Aymestrey, who had developed the structure of the rocks in his native county long ago, and had been his precursor in laying open the wonders of the system to which he (the lecturer) had afterwards given the name of Silurian. And now having expressed the gratitude under which he laboured to those gentlemen, he would proceed at once to give his hearers a general notion of the geological features of the surrounding country.

They were at that moment standing on a ridge composed of rocks of an igneous eruptive charcater, formed by fusion, which had come through all the

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sedimentary rocks around them. But at what period did they rise up through the surrounding sediment ? Some of the rocks in the Malvern Hills were amongst the oldest to be found in England. But he would direct them first to the extremity of the ridge, and take the rocks as they occurred in succession.

If they would carry their eye to the Obelisk in Eastnor Park, and then a little to the left, they would discover a dome which was composed of the oldest rock in the Silurian system. It was composed of sandstone, beautifully grained, and full of the shells of trilobites—the agnostus and olenus—all characteristic of the very oldest strata of the Silurian series. In Scandinavia or Russia—wherever these rocks occurred, when carefully examined, the same lesson was invariably read, though their mineral condition might be extremely different. If they could examine them at St. Petersburg, where none of them could now pay a friendly visit, but where he begged to say he had been most honourably and kindly received, they would find these very rocks in a state of unconsolidated mud. On the banks of the Neva they found limestones scarcely consolidated, in the very process of settling down and becoming rock—not yet hardened and indurated, yet they yielded precisely similar fossils to those found in the rocks to which he was now directing their attention. This was the condition of these strata all through the north and central portions of Russia. They never had been operated upon as these at Malvern had, by heat and igneous action, yet the fossil remains found in them prove them to be exact equivalents of one another.

When he first came through this part of the country the true system of classification had not been discovered, but now it is satisfactorily established that the age of rocks is in no degree determinable by the mineral characteristics, but only by the fossil remains found in them. Sir Chas. Lyell could tell them of a vast extent of country in North America, which, on this principle, had been proved equivalent to the Silurian and Devonian rocks of this neighbourhood, and he had thought it well to refer them thus to other countries in order that they might understand this point clearly.

If, from the dome to which he had already referred them, they would carry their eye into the valley of Eastnor Park, and descend into Stumps' Wood, they would find the sandstone connected with the limestone called the Woolhope limestone. The Woolhope limestones were the very bottom of the Upper Silurian series. The Upper Silurian rocks formed the chief strata in all the ridges which he saw before him on the Herefordshire side of the hills. The Woolhope were succeeded by the Wenlock limestones, which were characterised by fossils, many of which were preserved in the museum they would presently inspect, and they were identical with the rocks of which Gothland and those isles of the Baltic, which our fleet was now passing, were composed.

The intervening valleys were occupied by shales, and in the ridges which they saw over Ledbury they came to the Ludlow limestone. Their eyes would easily discover, from the very red colour of the fields, where the Red Sandstone of the great Devonian formation first came in, and overlapped all those strata which spread beneath them for so great an extent of country. The line of the

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eruption which had thrown up the Malvern ridge ran exactly north and south—they could trace it along the Berrow and Abberley Hills, and those who had long sight, yet further. He had come upon a little cone of syenite in the middle of a field about six or eight miles to the north of the spot where they were now standing, which fell exactly in the axis of this line of eruption, as marked by dialling with the other hills.

Sir Roderic finished his allusion to the oldest rocks on the Herefordshire side of the hills, by pointing the attention of his auditors to the magnificent escarpment in the distance, where the Old Red Sandstone took an entirely different dip, and went underneath the Carboniferous rocks of the Forest of Dean, and by asserting his belief that the rocks of the Old Red were entirely equivalent to those of the magnificent gorges of the Rhine, though there they are slaty and crystalised, while here they are argillaceous. Excepting as to a few Conglomerates and Cornstones found in the upper portion, nothing could be more monotonous than their appearance throughout; it only proved that, in different parts of the same seas, different conditions had existed, one part containing more lime than others, and so on.

Sir Roderic then turned to the New Red Sandstone on the Worcestershire side, differing *toto cælo* from the Old Red, and containing groups of organic remains entirely distinct. He then explained the position of the New Red with the Lias and Oolite from the maps of the Geological Survey, in which, by the bye, he said he hoped now that he was appointed Director of the Survey, to effect some little improvement—colouring the different limestones so as to make them more distinguishable.

Having just referred to the Bredon Hill as an outlying islet in the sea that once washed the Malvern Hills, and to the extensive denudation which must have taken place to cut it off from the Cotteswolds, to which it so evidently belonged, Sir Roderic showed how the age of the Malverns was determined by the condition of the rocks around it. There had indeed been an upheaval of the range since the New Red Sandstone was deposited at its base, for this rock was found tilted up against it at the extraordinary angle of 50 degrees, but this had been long after the Malverns had cooled down, for the sandstone was not in the least altered by heat at the point of contact—the disturbance had been merely mechanical. But blocks of Malvern Syenite were found imbedded in the Caradoc sandstone, which was much older than the New Red, and this proved that the Malvern ridge was in existence when these colder strata were in process of formation.

Sir Roderic then adverted to the proofs that a sea had once rolled down "the Straits of Malvern," between the Malvern and Cotteswold ranges, and that at a period when the climate was excessively cold; for huge boulders of granite, evidently detached from the mountains of Cumberland and Scotland, were found scattered all along this channel, and he could not conceive how they could have been removed so far except by the action of glaciers.

The whole of England must have been at one time connected with the continent of Europe, and the Isle of Man both with Ireland and England, for

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the fossil remains of immense animals, the mammoth and gigantic stags, were found in Ireland, Cheshire, and the Isle of Man, where but a single herd of them would have eaten up all that the Island could contain.

He might, he said, go on talking in this general way for an indefinite length of time; if he had had a party only of geologists to address he should have entered into details on one point only, but he saw around him many who were probably only just beginning to think about Geology. He was glad to see so many young people round, and he therefore contented himself with pointing out a few of the chief great phenomena of the region on which they were standing, in the hope that it might stimulate beginners in the science to pursue it with vigour and earnestness.

They would now take a look at some of the cuttings in the neighbourhood, especially a quarry in the North Hill, where they would see specimens of the very varied mineralogy of the hills. Some people called them granite, others porphyry, others greenstone, and others, with more propriety, syenitic; but amongst them were forms of all those older rocks; some specimens being found indeed even of gneiss, the oldest rock in the world; proving once more that the mere mineralogical character of a rock could not determine its relative age. The learned lecturer concluded amid loud applause.

Mr. Edwin Lees, F.L.S., then addressed to the company an interesting lecture on the Botany of the district, confining himself in his remarks, however, pretty much to pointing out the connection between geological and botanical studies, and to the assistance deriveable to the former from the latter. He entered into an examination of the fossil flora of the district, but said he would reserve all remarks upon the actually existing flowers till they met with them in their excursion.

A select party forthwith plunged, under Mr. Lees' guidance, into the woods and thickets at the bottom of the west side of the hills, in search of botanical rarities, but we believe they were not fortunate enough to meet with many very great novelties.

The Geological party, with Sir R. Murchison, Sir C. Lyell, Rev. W. S. Symonds, and others, descended the hill, and first visited the section where Miss Phillips, the sister of the celebrated professor, first discovered the Caradoc Conglomerate. Sir Roderic here called attention to a remarkable reversal of the strata, the lower beds actually overlying the upper, as a consequence of some violent volcanic action. The party then proceeded to a dingle near the lodge of the Rev. J. S. Cocks, at Mathon, where the same inversion was well seen. Some of the party proceeded with the Rev. W. S. Symonds round the end hill, examining various objects of interest on their way, especially a large quarry at North Malvern, where the New Red Sandstone touches upon the Malvern syenite.

The tunnel of the proposed line of the Worcester and Hereford railway could not be explored, as the works are now closed.

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After coming back from their rambles, the naturalists examined with great interest the Museum of the Malvern Club, which, although so recent in its origin, and entirely the result of the individual labours of its members, already makes a very fair appearance, and contains fossils which Jermyn Street may well envy. It is very tastefully arranged in a room immediately at the back of the shop occupied by Messrs. Lea, Perrins, & Burrow.

The Dinner took place at the Abbey Boarding House Hotel, at five o'clock, in the magnificent dining room of that establishment. A party of about 100 gentlemen sat down to a first-rate entertainment, which, with the excellent wines afterwards served, did all possible credit to the catering and tact of the proprietor, Mr. Wm. Archer. The Chair was taken by Sir Roderic Murchison, with the High Sheriff of Worcestershire and Sir Chas. Lyell on his right, and the Hon. and Rev. J. S. Cocks and Mr. L. Horner on his left. The Rev. F. Dyson occupied the Vice-chair. Grace having been said, and the cloth drawn, Sir Roderic gave the usual loyal toasts. In proposing "the Queen," he said that toast was always received right loyally whenever he proposed it to any scientific societies of the metropolis, and he had no doubt it would be welcomed as heartily by the dwellers in Siluria as any of the old Silurians would have welcomed Caractacus himself. (Laughter and cheers.)

With very commendable condensation, the Chairman insisted upon putting "the Army and Navy, the Bishop and Clergy of the Diocese, and the High Sheriff," all in one, and called upon Mr. Dowdeswell to reply to it.

Mr. Dowdeswell accepted the task very good humouredly, and concluded by proposing the health of Sir R. Murchison, Sir C. Lyell, and the other distinguished naturalists present, thanking them for their kindness in honouring the Club with their presence. (On the suggestion of Mr. Symonds, the toast was honoured with three times three.)

Sir R. Murchison, in replying to the toast, said he had never been so sincerely delighted to come before his country as on the present occasion, because he now found himself amongst his scientific friends in the region which he had so sedulously set himself to work out for a great many years. He proposed the Natural History Society of Worcestershire, and called upon Sir Charles Hastings to respond. He was delighted to find that the Society had been the means of grouping other Societies around it of such importance as those here present.

Sir C. Hastings replied at some length, attributing the establishment of the Worcestershire Natural History Society to the acquaintance which he formed with Sir R. Murchison when he was getting out his great work on the Silurian system. The Museum of that Society had succeeded far beyond its expectations, and had given a great impetus to the study of Natural History in the county.

The Chairman then gave the Natural History Field Clubs of Herefordshire, Worcestershire, Gloucestershire, and Warwickshire. They were doing the real work of science, and he hoped they would long continue to flourish. The

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geologists were infinitely indebted to their labours. He coupled with the toast the name of the President of the Malvern Club. (Loud applause.)

The Rev. W. S. Symonds, in replying, eloquently urged upon his friends the desirability of making the elements of natural science part of the education of the humbler classes, and read an interesting extract from a letter from Professor Henslow, showing how he had taught Botany to the children of the parish in which he resided. He thought the natural sciences ought to form part of the curriculum in our Universities, but certainly our working classes would be holier and happier for being instructed in the knowledge of these things.

The Rev. F. Dyson proposed the health of the honorary members of the Clubs, coupling with the toast the name of Leonard Horner, Esq. (Applause.)

Mr. Horner said he felt some shame in thinking that when he published (in 1811) his "Mineralogy of Malvern Hills," he had left so much unexplored, but was delighted to find the district was being so well explored, and expressed the great gratification which the day's visit had afforded them.

The Chairman proposed the health of Sir Chas. Lyell, amidst great applause.

Sir C. Lyell, in replying, alluded to the only visit he had ever made to Malvern before, 30 years ago, and to the progress which geological science had made in the interval.

Sir R. Murchison announced that the time for adjournment had arrived, and gave them their "next merry Meeting," for he hoped often to meet them again. (Cheers.) He promised, as Director of the Geological Survey, to send the Maps published by the Survey, and other valuable works, to their Museum.

The party then adjourned to the Saloon, where papers were read by Professor Buckman, Mr. Lees, and others.

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, TUESDAY, JULY 24TH, 1855.

EARDISLEY.

On Tuesday (24th) the members of this Club held their Second Field Meeting of the season at Eardisley. The attendance, owing to the wetness of the morning and other causes, was thin, but a very pleasant and instructive day was spent. At nine a.m., the party met at breakfast at the New Inn, the Chair being filled by the respected President, the Rev. J. F. Crouch, Rector of Pembridge. Between 10 and 11 o'clock, the sky having cleared, the party set out on their scientific exploration of the district.

The route taken was by Willersley and Letton to Bredwardine Bridge, and thence up the hill to the Cromlech, or so-called Druidical monument of Arthur's Stone. This Cromlech they found to consist of three large blocks of stone, of which the two* upon the ground are masses of Cornstone, while the superincumbent (which is also the largest) block, is of the Old Red Sandstone, placed in a horizontal position as regards the stratification. As the Cornstone "crops out," and is at present being burnt for lime, at a distance of about half a mile to the northward of this spot, and as the hill itself is of the Old Red, there is no ground for supposing that the Cromlech was formed of stones brought to the hill from any other place.

After examining the stone, the party proceeded along the pleasant green lane, in which Arthur's Stone stands, towards the northern extremity of the hill, which is known as Merbage point. The view westward as they passed along, was striking; the whole extent of the Golden Valley, dotted with scattered farm-houses, the secluded village of Dorstone, and the tall spire of Peterchurch peering out from amid the trees, and the ridge of Cusop and Vagar hills carrying the eye upward to the stern and bare Black Mountains, in the background; while the southern horizon was bounded by the Blorenge and the Scyrrid; and the Graig, Garway, Saddlebow, and Orcop hills led on the eye to the far-off Malvern range, the limit of view to the east.

From Merbage Point, a magnificent panorama delighted their eyes. The day, at this time, about 2 p.m., was brilliantly fine, and the fertile vale, bright with the windings of the glittering Wye—the wooded slopes of Ladylift and Bishopstone—the Upper Ludlow ridges stretching on to meet the broad hills of Radnorshire and the lofty Begwm in the west, with the ridges of igneous rock which surround it—made up a scene equally rich in natural beauty and in scientific interest.

* The separate supporters are eight in number. See page 158.—*Editor.*

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After resting awhile upon the Point, the party descended to the Cornstone quarry, but did not succeed in discovering any fossils. They then made their way to the Clock-mill Ferry, crossed the river, and returned by Letton to Eardisley, Mr. Bryan, the attentive host of the New Inn, being mindful of the great truth that even philosophers must dine, had a well-prepared dinner awaiting them; and the party betook themselves to the discussion of the different "formations" placed before them.

After dinner, Mr. R. W. Banks, of Kington, read a carefully prepared and interesting essay on the "Pterygotus problematicus" of the Downton Sandstone, which was illustrated by a number of well-executed drawings and several specimens found by Mr. Banks in the rock at Bradnor quarry, near Kington. A conversation ensued, which terminated in a vote of thanks to Mr. Banks for his excellent and valuable paper. The party broke up at 9 p.m.

The Botanical researches of the day did not produce many rare plants, but *Orobanche major*, *Carex pulicaria*, *Montia fontana*, *Potamogeton crispus*, *Epipactis latifolia* (abundant near Clock-mill Ferry), *Nasturtium palustre*, *N. terrestre*, *Hypericum pulchrum*, *H. humifusum*, *Aspargia hispida*, *Cerastium glomeratum*,,*Campanula patula*, *C. latifolia*, *Ranunculus hirsutus*, *R. flammula*, *Aspidium oreopteris*, &c., were found.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, TUESDAY, AUGUST 14TH, 1855.

LUDLOW.

This Society held its Third Field Meeting for this season on Tuesday, August 14th, at Ludlow. The day being brilliantly fine, there was a good attendance of members, and a very pleasant day was spent.

The Hereford members left this city by train at 7 a.m., and reached Ludlow at 8-15. On arriving at the station, they were met by a brother member, Mr. H. Salwey, of that town, who had hospitably invited the party to breakfast at the Cliff, where a number of the members of the Ludlow Natural History Society had already assembled. After having partaken of a sumptuous meal, the members proceeded to transact the business of the Club. The election of five new members (who had previously been proposed) was postponed in consequence of the list being full, and notice was given that it would be proposed at the next Annual Meeting to extend the number of members from 50 to 60. It was also notified that on the same occasion a plan would be submitted for forming and arranging a collection of Natural History specimens to be confined to those of this county.

Business having been transacted, the party, numbering exactly 40, started in three omnibuses and an open carriage (supplied by Mr. Prothero of the Feathers Hotel), and among them we noticed several ladies, who accompanied the party in their scramble across the hills, and who were much interested in the day's proceedings. Sir Charles Lyell, to whose labours geologists are so much indebted, accompanied by Lady Lyell, honoured the club with their presence.

The route taken was by Bitterley and Bedlam, towards the lofty Titterstone Clee Hill, whose basaltic peak forms so conspicuous a feature of the noble landscape around Ludlow. The view from the "Giant's Chair," to which the party ascended, was magnificent. Although there was a slight haziness in the sky, a vast range of country, unequalled in interest to the geologist, and unsurpassed in natural beauty, presented itself to the admiring eyes of the visitors. The massive Old Red mountains of Radnor Forest, the Hatteral, Scyrrid-fawr, and the range of Graig, Garway, Saddlebow, and Aconbury; the lofty hills which fringe—if we may so write—the Silurian islet of Woolhope; the noble igneous range of Malvern and Abberley; the broad mass of the Brown Clee, and the picturesque Silurian ridges and peaks of Caer Caradoc and the Stiperstones, successively met the eye as it wandered round the wonderfully beautiful landscape.

Titterstone Clee, as our geological readers are aware, consists of a patch of the Carboniferous system resting upon a huge mass of basalt, part of which, after coming up to the surface, has flowed over the coal, as lava covers the surface of

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the soil from beneath which it has risen. This fact, having been ascertained by geology, has been turned to account by the coal miners, who, in some places have bored through the basalt, and now work the Coal Measures beneath it. The party of course bent their steps across this basaltic capping, guided by the Rev. T. T. Lewis, to the sections of Mountain Limestone on the ridge of Knowl Hill, thence descending to the Golden Cross, where their carriages awaited them.

The visitors then proceeded to Nash Court, the residence of George Pardoe, Esq., who had previously invited the Club. Here they were entertained at an elegant déjéuner; an appreciation of his hospitality was expressed in an appropriate speech by the President (Rev. J. F. Crouch).

The Club has never since its formation received such attention as from its Ludlow members and their friends; and it will be doubtless gratifying to them to know that their guests were highly gratified. On returning to Ludlow, the members visited the Museum, which they found to contain a splendid collection, especially of Silurian fossils. Among the party were noticed Sir Charles and Lady Lyell, the Rev. J. F. Crouch, the President of the Club; Rev. T. T. Lewis, of Aymestrey; Rev. W. S. Symonds, Pendock; Rev. W. H. Thackwell, Rev. H. Lee Warner, Rev. T. Hutchinson, Rev. J. H. Barker, Rev. —. Hayward, Rev. H. T. Hill, Rev. J. Millar, Col. Colvin and Master Colvin, Captain Johnstone, Mr. H. and Mrs. Salwey, Mr. G. Pardoe, Mr. H. J. Pardoe, Miss Pardoe, Mr. F. Nash, Mr. H. Hodges, Mr. H. Lightbody, Mr. and Mrs. Hodgson, Mr. D. and Miss Lewis, Mr. C. Lingen, Mr. Suter (Hon. Sec), Mr. T. Curley, Mr. Marston, Mr. Cocking, Dr. Rowan, Mr. Ballard, Mr. A. Thompson, &c.

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EXHIBITION OF THE HEREFORDSHIRE HORTICULTURAL SOCIETY.

SEPTEMBER 4TH, 1855.

Two Herbaria were sent in to compete for the Woolhope Club's prizes, the competition for which was this year thrown open to the whole county. The collection which bore the motto " Feci quod potui " was almost wholly composed of plants gathered in the immediate neighbourhood of Hereford ; while the other Herbarium in like manner illustrated the botany of eastern Herefordshire. The commonest plants had been to a great extent omitted, but each collection contained some rare plants, although neither was so extensive as we have seen in former competitions for the Woolhope Club's prize. The Hereford Herbarium, which contained 376 specimens, and obtained the first prize (an elegant gold pencil-case) proved to be the compilation of Mr. Flavell Edmunds, of this City. The second prire (also a handsome gold pencil-case) was awarded to the Herbarium bearing the motto " Coetera desunt," containing 361 plants, sent by Miss Piper, of Blackway, Canon Froome. It was curious that the mottoes chosen should not only be both in the same language (Latin), but should make together a complete and appropriate sentence if taken in the order in which they were ranked by the Judges. Thus : " Feci quod potui ; coetera desunt"—I have done what I could ; the rest are wanting." The collections were prepared with much care, and were generally very correctly named. The second collection included a tastefully arranged bouquet of wild flowers, and several lichens and mosses. The numbers were reduced by disqualification of particular plants to those stated in the prize-lists. The plants in the second collection were put out on sheets of paper of too small a size to show properly the characteristics of the plants ; but they nevertheless evinced so much care in their preparation, that the judges recommended a gold pencil-case to be awarded to this collection also, which was done.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING,

Tuesday, January 22nd, 1856.

On Tuesday, January 22nd, the Annual Meeting of the Members of this Club was held at the house of the Hon. Secretary, Mr. Suter, in Bye Street, in this city. The Rev. J. F. Crouch, the President, oocupied the Chair. After the usual routine business had been transacted, five candidates were balloted for, and elected members. The President then delivered a highly interesting farewell address, detailing the operations of the club during the year, which the members unanimously requested the President to allow to be printed in connexion with the papers of the Club.

Mr. Flavell Edmunds proposed that Mr. Hewett Wheatley, the eminent Ichthyologist, should be elected President for the ensuing year. The proposition was seconded by Mr. Suter, Hon. Sec., and supported by the Rev. T. T. Lewis, Dr. Bull, Mr. Lingwood, and other gentlemen, and unanimously agreed to.

Mr. Wheatley, having taken the Chair, votes of thanks were passed to the late President and to the Hon. Secretary (who was unanimously requested to continue his valuable services). On the motion of the Rev. J. F. Crouch, a Committee was appointed to consider the propriety and feasibility of forming a Museum to be devoted exclusively to the Natural History of the County. The Field Meetings were appointed to be held at Bromyard on June 3rd; at Kington July 29; and at Abergavenny on September 9th. It was considered desirable that a bye-day should be appointed for the month of August, to enable the members to visit the meeting of the British Association at Cheltenham in that month.

ADDRESS OF THE PRESIDENT, Rev. J. F. CROUCH.

January 22nd, 1856.

Gentlemen of the Woolhope Naturalists' Field Club,—The time has arrived at which I am called on to resign the very honourable position to which you raised me a year ago, and to give some short account of the proceedings of our Club during that period, in obedience to the requirements of our eighth rule. This duty I could have wished to have fallen into abler hands than mine. I will not, however, waste more time than is necessary in apologies for inefficiency, of which I have too often been conscious, but offer my best thanks for your kindness to me, and proceed at once with my statement.

Firstly. It gives me great pleasure to inform you that our finances are in a healthy state on the whole. We have not yet thought it expedient to put the twelfth rule into force, but in justice to ourselves and candidates for admission

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we cannot long delay it. Secondly. Our club is full. We have no loss to lament —we have gained much. To our list of Honorary Members we have added Sir Charles Lyell, who may well be called a Working Member, for none, as I believe, of those who have had the pleasure of meeting him on two occasions within the year can have forgotten the zeal which characterized him in the pursuit of his favourite science, nor the frankness and freedom with which he imparted to the younger disciples in the same school the knowledge which he possessed. May our list of ordinary Members, to which we have had the good fortune to add several valuable men, furnish us with as ardent working men as Sir Charles Lyell. We shall then, year by year, with increased ardour, go forth in the spirit of the poet, to

"Read nature—nature is a friend to truth,
"Nature is Christian—preaches to mankind,
"And bids dead matter aid us in our creed."

Our meetings during the year have been as usual, three—at Malvern, Eardisley, and Ludlow. The first was an aggregate one of the Malvern, Cotswold, Warwick, and Woolhope Clubs, held there by the invitation of the Malvern Club, and was attended by Mr. Horner, who forty-five years before had written on the Mineralogy of the Malvern Range, Sir Roderick Murchison, Sir C. Lyell, and Mr. Brodie, of our Honorary Members, and a large number of good and true naturalists. The day was nearly all that could be wished, and will be long remembered by me, who stood on the summit of the Worcestershire Beacon for the first time in my life, and listened to Sir R. Murchison, as he directed our attention to the wonders that lay at our feet on the one side and the other of that marvellous range, in the successive formations of lower and upper Silurian, Old Red Sandstone, Carboniferous, New Red Sandstone, Lias and Oolite, and carried us with him to Russia and Scandinavia, where he himself had marked their equivalents, and to America, where Sir C. Lyell had done the same, and brought forcibly to our minds the words of the Psalmist, "O Lord, how manifold are Thy works, in wisdom hast Thou made them all. The earth is full of Thy riches." It is not for me to attempt to follow him through his lecture, nor to do much more than notice the eloquent parallel drawn by Mr. Lees, who succeeded him, between Geology and its sister (younger indeed, but perhaps more beautiful) Botany, and shewed how a kind providence has gradually clothed the rugged rock with verdure and with beauty, and at the same time put the indelible mark of change upon it all. The Geological division afterwards made their way to the quarry with which the name of Miss Phillips is connected, and found most interesting specimens of the Caradoc conglomerate, showing its junction with the igneous rock, and had their attention drawn to the great natural phenomenon of the overturning of the strata, by which the younger have taken the place of the older formation, and after a delightful ramble round the North Hill, noticing various objects of interest, particularly a large quarry at North Malvern, where the New Red touches on the syenite, returned to the Malvern Museum, where they met their botanical friends, who, under the direction of Mr. Lees, had examined the great bog, and a most interesting line of country, and had gathered many plants, but nothing very rare. After dinner, Professor Buckman read a paper on the Terebratulæ of the Oolite

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formation in the neighbourhood of Cirencester, and Mr. Lees another on some very remarkable forms of the cryptogamic Flora of Malvern, both illustrated by specimens and drawings; and in leaving this part of my subject, I feel that I should have done my duty very imperfectly, if I did not record my sense of the admirable endeavours of the gentlemen of the Malvern Club for the entertainment of their brother Naturalists of the other Clubs. I hope that we may take one lesson from them at least, and bearing in mind how much time may be lost in a description, when a specimen is before us, may ere long follow their example, and have a good local Museum of our own. I may mention that in the Museum at Malvern we saw specimens of the plumbago lately discovered in the tunnel on the Worcester and Hereford Railway, and perhaps the only disappointment which we experienced was the loss of the opportunity of examining it in *situ*, on account of the works being suspended.

The following day was intended to be devoted to the examination of the Keuper beds at Pendock by one section, and some portions of the south end of the Malvern range by another; but after exploring one bed of the Keuper, and an outlier of the Lias on Berrow Hill, in a wood near which latter place we saw the Listera Nidus Avis, or Bird's Nest Orchis, in great luxuriance, nature proved that she had a black as well as a fair side to her face, and a heavy continuous rain forced us from the field. Thus ended our first meeting.

We now descend from great things to small. Our second meeting was fixed for Eardisley, and a more unpromising morning for an excursion I have not often witnessed. We met few in number, and the rain having ceased after breakfast, started for Bredwardine Bridge, and from thence up the hill, intending to make for Arthur's Stone. (In this part of our walk we found Orobanche Major in great plenty.) We were the more anxious to see this ancient monument of people and times long passed away, for it had been suggested that it might be a boulder, and throw some light on the glacial theory, but it seems to be formed of simply the stone of the country. The supporters, eight in number, are of cornstone, which is found in a quarry a little lower down the side of the hill, at about the distance of half a mile, where it is burned into lime. The horizontal one is of the chocolate coloured sandstone, found in a quarry at the north point of the ridge. We found no fossils of any kind. We descended the hill, crossing the Wye at Clock Mill Ferry, and reached Eardisley by way of Winforton and Willersley, having catalogued about 230 plants. After dinner, Mr. Banks read a most interesting and valuable paper on the subject of the discoveries which he has lately made at Bradnor, near Kington, in the tilestones, illustrated by specimens and drawings; but as this will very shortly form part of the proceedings of the Geological Society, and as there is reason to believe that his drawings of the Pterygotus will be engraved and form part of a forthcoming Decade of organic remains, under the direction of Mr. Salter, in conjunction with the magnificent suite of allied genera, and species which have been recently procured from the uppermost Silurian Black Schists of Scotland, I feel that I shall better discharge my duty by referring you to them, than in any other way.

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Our third and last meeting was at Ludlow. The early morning was spent in the Museum, where we had the advantage of seeing some of the most interesting specimens lately collected in the neighbourhood, by Mr. Lightbody and others. The route for the day was by way of Bitterley to Titterstone summit, where, after examining the basaltic capping, and tracing the walls of the ancient encampment, we crossed the basin to Hoar-Edge, and on to the mountain limestone, and works at Nover's Farm, remarking, as we went, the columnar form of the basaltic rocks, and picking up some specimens of the Ironstone. Here Sir Charles Lyell called our attention to a remarkable curve in the strata, and a red line in those overlying the limestone, which did not appear to be explained. On our way back to Ludlow we examined a quarry or two at the base of Tinker's Hill, near Cainham Camp. The botanists were more successful than usual. Mr. Hodges, of Ludlow, shewed a specimen of Osmunda Regalis, gathered on Clee Hills. Polypodium Phegopteris, P. Dryopteris, Pteris crispa, Aspidium Borreri, Campanula Hederacea, and other curious and interesting plants, were found. I may say that our physical wants were most carefully attended to by Messrs. Salwey and G. Pardoe, Nash Court, who kindly threw open their houses for our accommodation, and of them I must beg the acceptance of the best thanks of the Club. Such is the best account which I am able to give of our meetings. I only wish that it were more worthy of your notice. Your eighth rule seems to look for "such observations as your President may deem conducive to the welfare of the Club, and the promotion of its objects."

The constitution of our Club supposes us each more or less engaged in the pursuit of natural science, and provides "that members finding rare or interesting specimens, or observing any remarkable phenomenon relating to any branch of natural history, shall immediately forward a statement thereof to the Honorary Secretary," and this is required for "the formation and publication of correct lists of the various natural productions of the country." This rule has not been so exactly observed as probably it might have been. I have, however, endeavvoured by applications to particular members, to do something towards the supply of this deficiency, and I am bound to say that those applications have been met in a very liberal spirit: so much so, indeed, as to persuade me that it is only necessary to call attention to this rule, in order to obtain very interesting papers at our meetings.

I shall begin with Mr. Purchas, who has, in a particular manner, taken charge of the botanical portion of the objects of the Club. It has been often remarked, that no list of the plants of this county has been published. This is true, but it must not be supposed that no attempts have been made. The labour of examining a county is no light affair. It must be borne in mind that unpublished manuscripts like Mr. Williams', the value of which is acknowledged by Mr. Leighton in his excellent Flora of Shropshire, are known to exist, and that he has had only a small number of assistants in his enquiries. That you may know something about what has been done and is doing, he has kindly furnished me with a statement, the substance of which I will read to you.

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The map of Herefordshire has been divided into fourteen districts, somewhat arbitrarily perhaps, for, natural divisions being impossible, convenience suggested them.

The total number of flowering plants and ferns as yet satisfactorily ascertained, is somewhere about 750. This does not include such doubtful natives as Castanea vesca, nor plants, which, like Hesperis matronalis, have been met with in clover fields and cultivated ground. Neither are the forms of Rubus fruticosus separately reckoned. Of these, 702 are recorded in Mr. Purchas' own district (No. 2), the remaining 48 are then scattered irregularly among the others. This number, he thinks, ought not to satisfy us: when we consider the variety of soil and geological formations within the boundary of the county, the number of species which it may be expected to produce must be nearer 800. The districts 1 and 2, comprising the part of the county bounded by the Newport and Abergavenny Railway on one side, and the road from Mordiford to Lea on the other, have been fairly examined, although neither of them can be said to be exhausted—especially the northern parts. From each about 700 species are recorded. No. 3, adjoining No. 2, and running south from Tarrington, produces some of the rarer plants of the county, *e.g.*, Lathræa squamaria, Convallaria majalis, Potentilla verna. It has been chiefly examined by Mr. Lingwood, when resident at Mordiford, and on the occasion of the first excursion of the Club, a considerable number of species was catalogued. The district about Tarrington, Putley, &c., still requires examination. Of No. 4, which may be called the Ledbury district, the eastern part of which comes within the limits of Mr. Lees' "Malvern Botany," a reference to that interesting little book establishes many species as natives of our county, but there is still a large tract of ground, comprehendeng the parishes of Bosbury, Canon Frome, Castle Frome, Munsley, &c., which remains, so far as we know, unexplored.

No. 5, which we call the Bromyard district, distinguished as containing the habitat of the most remarkable plant in the county, Epipogon Gmelini, has been very imperfectly examined. Lees' "Malvern Botany" gives some help as to the plants of the south part, and Messrs. Purchas and Hutchinson catalogued as many species as they could (between 200 and 300), on the occasion of their search for the Epipogon last summer, which I regret to say was unsuccessful. From No. 6, extending right and left of the road from Bromyard to Hereford, a few plants are recorded, but the parishes of Pencombe, Ullingswick, Cowarne, Marston Chapel, and Moreton Jeffreys, have not hitherto been examined with a view to forming anything like a complete list.

From No. 7, the Hereford district, Mr. Davies has collected a good number of species, and Mr. Purchas has marked down others from the prize bouquets of the Horticultural Society, and from his own visits, to the number of 400 or more, but it is clear that examination is needed.

From No. 8, bounded on the north by the road from Leominster to Willersley, Mr. Blashill, who was very careful and accurate, has recorded 463 species.

No. 9, extending to the north from Leominster to Orleton and Brimfield, has been very diligently worked by Mr. Hutchinson, who, in the course of last summer,

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has added Convallaria multiflora, which, until that time, had never been known to grow in the county. There is every hope and expectation that a few more may yet be recorded. The number at present is believed to be nearer 600 than 500.

In No. 10, comprising Aymestry, Wigmore, and Leintwardine, Mr. Thomas Woodhouse's observations, and the excursions of the Club, have brought up the number of species to 463. Lathræa squamaria is plentiful near Kinsham.

Of No. 11, called the Kington district, I fear that very little is at present known. Messrs. Hutchinson and Miller have found a few interesting plants, and among them Mœnchia erecta.

No. 12, a narrow slip extending from Leominster to Brilley, is considered more particularly my district. I wish that I could say it has been more closely examined than it has been. Of the western portion I know very little indeed. The number of species ascertained may be about 500.

From No. 13, the Golden Valley district, Mr. Blashill has recorded a small number of species found in the northern part, and the excursion of the Club in 1854, to Monmouth Cap and Rowlstone, has enabled us to record a few hundred species from the southern part.

No. 14, containing the south-west portion of the county, adjoining the last, remains almost unexplored.

In the Geological branch of our proceedings, the discoveries made by some of our members, as well as the light thrown on them by those of others in Scotland and elsewhere, are most interesting. I am informed by Mr. Symonds that the Upper Ludlow bone bed has been discovered near Malvern by the Rev. F. Dyson, at Brockhill Copse, identical in position, &c., with the other known localities. A great discovery has recently been made by Mr. Salter, viz., that the Cambrian rocks of the Longmynd are fossiliferous—that trilobites and fucoids are found there, and it seems to remain for Sir R. Murchison to announce, in his second edition of Siluria, that there are no stratified deposits which can be called azoic. With regard to Mr. Lightbody's discoveries, I beg to say that I requested him to give us some account of them in a paper, or allow me to incorporate them in this address. He has chosen the latter mode. In a letter just received he says, "I found on Whitcliffe in the spring, a trifid tail or spine of some crustacean, which I fancied might be 'Leptocheles,' and which, when sent to London, was at first said to be a 'Dithyrocharis,' but is now, on further examination by Salter, pronounced to be 'Ceratiocharis,' a *new species*, which he has called 'Robustus,' being much stouter in the make than the spines called 'Leptocheles Murchisoni,' and which must now be called 'Ceratiocharis Murchisoni.' Mr. Salter, looking through our museum at Ludlow, in the autumn, fortunately discovered in an unnamed species, the tail or body of probably L. or C. Murchisoni, with the base of the spines attached, and which came from Clunbury. One of my boys afterwards found on Whitcliffe, two joints of the body, with parts of spines attached, and exhibiting longitudinal striæ, and therefore probably differing from the Clunbury specimen." This fossil is engraved in the October number

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of the Edinburgh New Philosophical Journal. It may be satisfactory also to state that Professor Harkness has informed Mr. Symonds, that among the discoveries of Mr. Slimon, at Lesmahago, in Scotland, there are some trifids like Mr. Lightbody's Phyllopod.

He then informs me of discoveries of portions of the Pterygotus, which the Ludlow Geologists have made, especially one which looked like a fish's tail (membranaceous scaly above), together with some spines, which Mr. Salter considers to be the end of one of the swimming limbs, also of a new kind, which Salter calls Himanopterus punctatus. But I hope that he may himself be prevailed upon to give us a paper on the subject of that, and of his other discoveries, including the star fish af Leintwardine, and a "rara avis," which has fallen in his way, Ascoceras Bohemicus, noted by Barrande in Bohemia, but never until now found, or at least made known, as British. And in this hope, I shall desist from further notice of the letter.

Mr. Banks also most kindly responded to my request for information, by sending me an account of the Scottish discoveries, and his own at Bradnor, but as they have been published in the Society's reports, I must refer you to them for fuller information than I can give, except by copying the whole report. He has seen, and reports that the Scotch fossils are most instructive and interesting, because in many instances the form of the animal is all but entire, while all the peculiarities of form are remarkably preserved. He says, you may imagine how perfect some of the specimens are, when I mention that, with the aid of a glass, the pair of jaw feet in one specimen is seen with its inferior articulations in working order; and that, in most instances, the didactyle foot, with its pincer, is entire. They occur on large slabs of a slaty material, and look like casts of black sealing wax. Many of the portions, especially the jaw feet, resemble the Pterygotus, and there is but little doubt entertained by Mr. Salter that the Himanopteri are closely allied to Pterygotus.

Mr. Banks also informs me that his cephalaspis-like heads have, with C. Lewisii and Lloydii, been provisionally styled Pteraspis. To this I may add that I have found some good specimens in the Leysters beds, as well as a portion of a head, but perhaps of a different species from the Lower Ludlow at Leintwardine. This fact seemed curious enough to warrant my mentioning it here.

I may mention that the Meteorological observations of the Club have been continued under Mr. Wheatley's superintendence, and I think you will agree with me, that our thanks are eminently due to him for the pains which he has taken in that department.

As regards the Zoology of the county, I know not that I have much to say. I have seen by the papers that a specimen of the Red-throated or speckled Diver has been taken near Ross, and in my own parish, a pair of the Anas clypeata, or Shoveler duck, and a Green Sandpiper are the principal strangers, if indeed they are strangers.

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In the Entomological department, I hope my successors may have more to say than I have. We have now on our list more than one good observer. I trust we shall not look to them in vain.

I know not that I can add anything to what I have said. Permit me then to repeat my thanks to those who have done the work of the Club cordially with me in the field, and in an especial manner to those who have given me their assistance in this my account of myself and them. I hope before long that we shall have an answer to those who look with wondering eyes on our baskets, bags, vascula, and nets, in a museum which shall be worthy of the county; and to the conceited "cui bono" enquirer, be able to say "Circumspice."

DRIFTS OF HEREFORDSHIRE.

At the Annual Meeting on Tuesday, January 22nd, the following objects of interest were laid upon the table for examination:—Finely stuffed specimens of the Red-throated Grebe, exhibited by Mr. Lee Warner, junior; a collection of deers' horns and bones found in the sewerage excavations, Hereford, by the Honorary Secretary; some specimens of the Hereford Drifts, consisting of Ludlow rock, Lydian stone, felspathic and Cambrian rocks, &c., by Mr. Flavell Edmunds. —From *The Hereford Times*, February 2nd, 1856.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, JUNE 3RD, 1856.

BROMYARD.

On Tuesday, June 3rd, the members held their first Field Meeting for the season. Bromyard having been fixed for the place of meeting, a party of members left Hereford for that town about 7 a.m. The morning being brilliantly fine, and the effects of the late rains and subsequent warm days being everywhere visible in the luxuriant beauty of the vegetation, the ride was a delightful one. About 9 o'clock the members arrived at the Falcon Hotel, Bromyard, where they were joined at breakfast by several members and visiting friends from the neighbourhood.

In the absence of the President (Mr. Hewett Wheatley, of Hereford), Mr. R. M. Lingwood, of Lyston, was called to the Chair, and the usual routine business was transacted.

About 11 a.m. the party started on a scientific exploration of part of the exquisitely beautiful scenery which surrounds the clean and quiet town of Bromyard. Taking the Tenbury road for a short distance, they crossed Buckenhill Park, leaving on the left Edvin Camp, and Edvin Ralph, and making their way through the valley near Saltmarshe Castle to Edvin Loach.

After examining the quaint little church at that spot, as well as the various small quarries on the line of route, the party made their way by Norton to the beautiful heights above Linceter.

Here the magnificent view stretching from Titterstone Clee by Abberley Hill, Clifton-on-Teme, Ankerdine Hill, the wooded vale of Teme, the "fair champagne" of Worcestershire, to the lofty heights of the Malvern ridge, contrasted with the picturesque wooded valley at their feet, long detained the admiring gaze of the party. For its scientific interest alone, the landscape could not be surpassed anywhere; the working out of the Silurian system by Sir R. Murchison, from those very hills, making the scene classic ground, while the variety of strata, palæozoic and mesozoic, aqueous and igneous, sandstones, limestones, coal, and the volcanic syenite, towering high over them all into the blue heavens, suggested to the geologist abundant matter for thought. The unknown vastness of the bygone periods indicated by the view, no less than the vast number of the forms of life represented by the fossils garnered up in hill and dale before the eye, gave an added charm of the highest kind to the wondrous natural beauty of the scene.

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Passing from this enchanted spot, the party made their way down to the curious old Moated Grange and ruined Church of Brockhampton. Here the Elizabethan gatehouse and drawbridge, and the singularly beautiful tracery in the east window of the desolate Church, attracted much admiration.

After ascending the wooded hill to Upper Brockhampton, the party passed through Clater Park on to the "breezy downs." At the great quarry on this elevated spot they spent some time, and then made their way back to their hotel at Bromyard, fully prepared to extend their investigations to the viands which awaited them.

After dinner, a pleasant hour or two was spent in conversation, of which one of the subjects was the extent and nature of the Drift in the valleys of the Wye and Lugg. The discussion on this subject was introduced by Mr. Flavell Edmunds, of Hereford, and participated in by the Chairman, the Hon. Secretary, the Rev. Mr. Hill, of Felton, Rev. Mr. Kershaw, of Bromyard, Mr. Curley, of Hereford, and other gentlemen.

The botanical members did not find any rare plants during their ramble, the extent of which, indeed, prevented any great amount of time from being bestowed on the examination of any place which they visited.

About 7 p.m. the party broke up, and after some of the members had visited the venerable and interesting old Church—the Rev. Mr. Kershaw kindly acting as cicerone—the Hereford party left the town soon after 8 p.m., and arrived in this City about 10 o'clock.

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, TUESDAY, JULY 29TH, 1856.

KINGTON.

The members of the Club held their second Meeting for this year at Kington, on Tuesday, 29th July, when the following members were present:—Mr. R. W. Banks, Mr. R. Lightbody and son, Mr. W. H. Purchas, Dr. G. P. Bevan, Col. Colvin and son, Rev. J. F. Crouch, Rev. T. Hutchinson, Dr. Samuel Steele, Mr. A. Thompson, Mr. T. Curley, Mr. J. Cocking, and Mr. Salter, of the Museum of Practical Geology, Jermyn Street, one of the hon. members, who conferred a great favour upon the Club by his kind attendance and lucid remarks upon the different rock formations visited in the course of the day.

The party having breakfasted together at the Oxford Arms, and having gone through some preliminary business, proceeded to the house of Mr. Banks to inspect his splendid collection of fossils. A drawing of the *Pterygotus anglicus* was exhibited, and explained by Mr. Salter. The drawing is designed to illustrate a paper to be read at the British Association at Cheltenham. This huge crustacean was about 9 feet long, being supplied in addition to the pincers, with two swimming feet, or paddles. The body, which is conical, consists of a series of moveable rings, terminating in an oval-pointed tail. Nearly the whole of the parts have been found, leaving very little for the comparative anatomist to fill up in order to complete the animal.

The party, under the guidance of Mr. Banks, proceeded to the Ivy Chimney quarry, where large boulders of trap rock, probably from Hanter Hill, and Woolhope limestone, were found imbedded. After spending about half an hour in this quarry, they proceeded to a quarry of Downton Sandstone on the top of Bradnor Hill, when a large quantity of fossils were found, the most interesting being the swimming feet and pincers of the *Pterygotus*. These specimens were the largest ever found, and fully bear out Mr. Salter in his theory that the animal attained a very large size.

After spending about an hour and a half in this quarry, which lies at the base of the Old Red Sandstone system, the party proceeded down Newton Lane, where the Upper Ludlow formation of the Silurian system is very finely developed. The strata in this part are exceedingly prolific in fossils, every person filling his bag with very fine specimens. After spending about two hours in "grubbing" and "bagging" fossils in this lane, the day's work was brought to a close at the Castle Hill, where the tram-road cutting lays the rock bare for about 50 feet in

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perpendicular height. The beds are very much tilted up here, the angle being about 45 degrees. The fossils here are much larger than in Newton Lane, but not so numerous.

The day's work having terminated, Mr. Salter left on his way to Cheltenham, and the remainder of the party proceeded to Downfield, the hospitable mansion of Henry Miles, Esq., where they were entertained at dinner.

The botanical part of the day's exploration was interesting, although it did not issue in the discovery of many fresh plants. The tract of ground examined being small, the list of plants was necessarily small also; still it is a step in advance to have formed a catalogue (however small) of the species in the Kington district of our county. The best plant of the day gathered within the limits of our county was *Moenchia erecta*, hitherto our only Herefordshire locality for which was the Malvern Hills. An *Agrimonia* also was gathered, which may possibly turn out to be *A. odorata*, or, if not, is a connecting link between it and *A. Eupatorium*. The other plants were only the common ones of the county.

The next Field Meeting of the Club will take place early in September, at Abergavenny. It is proposed to examine the Coal districts of South Wales at the same time.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, TUESDAY, SEPTEMBER 16TH, 1856.

ABERGAVENNY.

On Tuesday, September 16th, the Third Field Meeting of the Woolhope Naturalists' Field Club was held at Abergavenny. A party of the members left Hereford by the 8 a.m. train, and were joined by other members at the Tram Inn station. On reaching Abergavenny, the members made their way to the Greyhound hotel, where they were met by Mr. E. Y. Steele and Dr. Bevan. After breakfast, the Rev. J. F. Crouch, Rector of Pembridge, was called to the Chair, in the absence of Mr. Hewett Wheatley, the President.

The minutes of the last Meeting having been read and confirmed, Mr. Flavell Edmunds made (at the request of the Hon. Secretary) a brief report of the proceedings of the Museum Committee, narrating the negotiations with the Philosophical Institution, for the use of a part of their premises, in which to place the collection designed to be made by the Club. The Institution had, however, fixed the rent to be paid at £15, which sum the Committee considered to be much too high, seeing that the Club would also have to bear the greater part of the salary of a Curator. They had, therefore, come to the conclusion that it would be most for the advantage of the Club to engage separate premises, and form their Museum entirely independent of any other society. The Committee further considered that the nature of the proposed collection for which a great many specimens have already been promised, renders it desirable to have it in a place easily accessible to the members and their friends; and they believed that suitable premises might be obtained for a moderate sum, and a qualified person may be engaged as Curator. Of course, it was understood that the Museum would be, not a general collection, but strictly a representation of the Natural History of the district, in the various branches of geology, botany, zoology, ornithology, ichthyology, and entomology. The visitor would thus be able to ascertain precisely the nature of the soil, the rocks, the natural products, and the animals of the district. The Committee had, of course, taken no steps beyond making enquiries.

Some conversation ensued, in which the Chairman, the Rev. T. T. Lewis, the Rev. W. S. Symonds, and other gentlemen took part; and it was ultimately agreed that the Committee (which conists of the President, the Hon. Secretary, Rev. T. T. Lewis, Rev. J. F. Crouch, Mr. Lingwood, and Mr. Edmunds) be requested to continue its inquiries, to take such steps as shall seem desirable, and to report to the annual meeting in January next.

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The routine business having been transacted, the members started about 11 o'clock on their day's explorations, Dr. Bevan, of Beaufort, kindly and ably acting as guide. As the strata on the northern boundary of the great South Wales Coal-field were the principal objects to be viewed, and as the distance to be covered was consequently great, the party engaged and filled a stage-coach, by which they were conveyed over the first and least interesting part of their journey. Taking the Merthyr road, they passed rapidly out of the charming valley of Usk, by way of Llanfoist and Govilon to Clydach. Here the romantic beauty of the scenery, the richly wooded dells, the lofty hills, the little village clinging to the hill-side, the canal-aqueduct, the broad vale of Usk, and the mighty Pen-y-fâl, Gadr, and Scyrrid, in the background, made up a landscape not easily to be surpassed, even in Siluria. The natural charms of the scenery lost nothing from the alternations of bright sunshine and light cloud. The morning had been dull, but as the day advanced, the nimbus clouds melted into the azure, and the magnificent cirrus and cirro-stratus clouds, which hung almost motionless in upper air, at once added to the beauty of the scenery and tempered the heat. Fortunately for the party, the day continued to be fine throughout, and was followed by as fine an evening.

On reaching Bwlch-y-cwn ("the dog's pass"), the explorers dismounted from their vehicle, and descended into this wild and picturesque wooded glen. The aspect of the country at this spot is characteristic of the junction of the three strata, the Mountain Limestone and its immediate neighbour-strata, the Red Conglomerate, and the Millstone Grit. Lofty hills with broad summits and steep precipitous sides; beautiful glens resounding with water-falls, and streams making their way over the naked rock; a rich clothing of vegetation shutting out the depths of the valley from above, and giving to the gazer from below lovely pictures of "chequered shade," as the sunbeams peer between the leaves.

Ascending again from this beautiful valley, the party soon afterwards again quitted the road in order to visit the limestone qaurries on the hills. Passing by Ffynnon-y-coed, they ascended Craig-y-gaer, which is in fact the eastern corner of the immense hill called Myndd-pen-cyrn. The mountain limestone is worked at several places on this hill; and the sound of many hammers, on reaching a quarry, proved that the geologists were busy. After bagging a few fossils, the party made their way along the tram-road past Yr Hafod to Brynmawr, and thence to Beaufort. Here Dr. Bevan kindly entertained the party at a very handsomely provided lunch.

The visitors afterwards spent some time very profitably in inspecting Dr. Bevan's interesting collection of fossils from the Coal Measures of the immediate neighbourhood. Besides many beautifully perfect specimens of the vegetation of the Coal period, Dr. Bevan's collection included some specimens of the highest possible interest to geologists, viz., teeth, scales, and bones of fish of the same Carboniferous period embedded in the black shale.

The members started about 3-30 for the pits of the Beaufort Iron Company, and spent a considerable time in examining one of the workings on Cefn-meiddig,

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where the ironstone and the coal crop out, and are worked in the open air. An excellent section is thus obtained. The stratum immediately below the surface is a ferruginous sandstone, in which large nodules of ironstone occur. Below is a large coal-bed, some 12 feet in thickness, divided by a thin shale into two seams; the upper being the well-known Red Ash, the lower the less valuable White Ash coal. Here an intelligent workman, who has benefited by the instruction of Dr. Bevan, pointed out to the party a *Calamite*, one of the tree-reeds of the carboniferous period, standing upright in the ironstone bed. He stated that, when first laid bare, at least 20 feet in height of it was visible: and it was not yet fully uncovered. Some of the members brought away fragments of this "tree." The bark was converted into coal, but the centre of the stem was wholly sandstone.

From this very interesting spot, the party were taken to the cottage of the workman before alluded to, where they were no less surprised than gratified to find a collection of valuable specimens of *Sigillaria*, *Lepidodendron*, *Calamite*, ferns of various species, and other fossils of the Coal-beds.

As the day was by this time fast waning, the members hastened to Brynmawr, at which place they found their vehicle awaiting them. A smart drive of ten miles brought them back to their hotel at Abergavenny. There an excellent dinner, provided by Mr. Philip Morgan, was an agreeable realisation of the great scientific truth that even phliosophers must dine, if their explorations of nature are to be rendered satisfactory to body as well as mind.

The Rev. J. F. Crouch presided, and the company included among the visiting friends, C. C. Babbington, Esq., the eminent botanist of Cambridge; Dr. Samuel Steele, of Abergavenny, and Mr. James Davies, of Hereford. Of members present there were: Revs. T. T. Lewis and W. S. Symonds, Dr. Bevan, Dr. Gilliland, Mr. E. Y. Steele, Mr. Suter, Hon. Secretary, Mr. Lingwood, F.R.S., Mr. Flavell Edmunds, Mr. A. Thompson.

After the removal of the cloth, the Chairman gave the health of the Queen, which was followed by the health of Dr. Bevan, with thanks for his kindness in guiding and entertaining the members that day. Dr. Bevan neatly acknowledged the compliment. On the suggestion of the Hon. Secretary, which was unanimously agreed to, the Chairman requested Dr. Bevan to draw up a narrative of the day's excursion, in order that it might be published in the Society's transactions. Dr. Bevan consented to do so; and intimated that he was making a collection of fossils of the Carboniferous strata for the intended Museum of the Club. At 8 p.m. the company separated, having spent a most agreeable and instructive day.

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SIR W. JARDINE ON THE ICHTHYOLOGY OF HEREFORDSHIRE.*

The first issue of the Transactions of the Woolhope Naturalists' Field Club, including the Annual Addresses of the successive Presidents, and a selection from the many interesting papers which have been read at the meetings, having reached the hands of that distinguished naturalist, Sir Wm. Jardine, has elicited from him a very gratifying expression of approval and encouragement. In a letter to the Rev. W. S. Symonds, Rector of Pendock, lately President of the Club, Sir William Jardine thus refers to the Club, and to Mr. Hewett Wheatley's very valuable paper on the Ichthyology of Herefordshire, which forms part of its Transactions:—

"Let me congratulate the members of the Club on their progress and the publication of this first record of their doings. All they have to continue to do is to work steadily to record their observations, and in time, far less than they think, these Transactions will bear a value and be much estimated. They will be part and parcel of a great Natural History of England yet to be drawn up. I was glad to see the Ichthyology taken up, and particularly the remarks of the Salmonidæ by Mr. Wheatley, with which you know I am at present working. I trust Mr. Wheatley will continue his observations, and I enclose, for such members of your Club as are interested in the pursuit, a few copies of the report read at Cheltenham on the experiments at Stormontfield regarding artificial production. You will see from this that one of the facts which Mr. Wheatley states as proved (*see antea pages* 62 *to* 78), is just one of those which has been a point of dispute, and helped to originate the Stormontfield ponds. The experiments now in progress will prove (next May) whether any portion of the brood of young fish assume the migratory dress within the twelve or thirteen months; but I have no doubt. whether this is the case or not, that a great deal might be done artificially to increase the produce of any salmon river, and at no great expense of old fish, as the salmon, if carefully handled during the expulsion of the ova and their impregnation, are not killed, but as in the case of the Tay fish, have even been a second time captured and employed. I am not sufficiently acquainted with the Herefordshire rivers to know much of their contents, but it appears to me remarkable that the other migratory salmon should be such rare visitants as Mr. Wheatly mentions. And now I will ask Mr. Wheatley in future to give us scientific names as well as common ones—the use of provincial names only is one of the fertile causes of all confusion. Thus salmon trout is commonly applied over Scotland to various small fish (3 to 4 lbs.) and indiscriminately to the two other migratory species, so that in some places salmon trout would be synonymous to Mr. Wheatley's sewin. "Sewin" is a provincial name used chiefly, I believe, in Wales; but I rather think it is indiscriminately applied to both Salmo trutta and Salmo eroix. Would your Club understand me if I asked them to send me herlings or whitings from the Wye? I have killed sewin in a small stream at Aber, about ten or fifteen miles before you reach Bangor; they

* From the *Hereford Times*, November 1st, 1856.

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were small fish, about ½ or ¾-lb. weight, and were equivalent to our herling of the Annan river, which is the young state of Salmo trutta in its first appearance in the rivers after having gone to the sea in a migratory dress. This I have seen, and have the specimens. I understand, however, that the term sewin is applied also to a fish of from 1½ to 3 lbs., in all probability equivalent to our Annan sea trout; but this I have not proved. I shall send you our herling (young S. trutta) and S. albus) to compare. This would be quite a legitimate part of any local collection as illustrating the subject (you know I object to miscellanea in local collections), and would fix the species of some of those fish which are so often locally mentioned. As an instance of the disadvantage of using local names, and without attention to what they are applied, I am at present trying to make out the geographical distribution of the common salmon, and the difficulty of doing so, with any satisfaction to your own mind that you are right, is very great. Plenty of notices of salmon over nearly all the world; but what are they? Certainly all are not our British S. salar."

THE SALMONIDÆ OF HEREFORDSHIRE.

*To the Editor of the Hereford Times.**

Sir,—In a communication by Sir W. Jardine to the late President of the Woolhope Naturalists' Field Club, inserted in your last publication, in reference to Mr. Wheatley's paper on the Salmonidæ of Herefordshire, Sir William makes some interesting remarks on the breeding of salmon, but appears sceptical as to the rare habitats of the Salmo eroix or sewin, and of the Salmo trutta or salmon trout, in the rivers of this county; and appears desirous of eliciting some further information. As I have been acquainted from long experience with the rivers of this county, as well as with most other rivers in the kingdom frequented by the three species of migratory Salmonidæ, and have devoted some attention to the subject, I would beg permission to make a few observations.

The S. eroix is the sewin of South and North Wales, in the rivers of which, especially the former, they are numerous; as also in most of the rivers of Scotland, instance the Tweed and its tributaries, in one of which, the Teviot, they attain a considerable size. Those of 2 to 4 lbs. weight are called "square tail," those of 6 lbs. and upwards "round tail"; so termed because the ultimo fin presents that appearance at their various ages. The fish is thick and chubby about the head and neck, as compared to the salmon (S. salar); hence, I presume, the prevailing name in Scotland of "bull trout." Its flesh is paler and inferior to the S. salar.

The Salmo trutta, or salmon trout, is, according to my experience the least distributed of the tribe; but it prevails in many of the rivers of North Wales, where I have captured them from 1 to 3 lbs. weight, and especially at a small river at Bangor (not the Ogwen). Its flesh is equal to the true salmon, and of high colour; it is shorter in proportion than the other two species, the number of vertebræ being 58, the S. eroix 59, and the S. salar 60.

* From the *Hereford Times*, November 8th, 1856.

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I think Mr. Wheatley is correct in saying that the two former are rare visitants in the only salmon river of this county—the Wye; indeed, I am not well aware of a well authenticated instance of the kind. I have noticed, wherever a river contains a fish of either species, that they are tolerably abundant, and I very much doubt the existence of either in any of the rivers that debouches into the estuary of the Severn, or mouth of the Bristol Channel. Yet in the rivers of Carmarthenshire, and north of Glamorgan, the sewin much abounds. I was some years ago led to believe from the fishmongers there that these fish were found in the Wye, but this assertion must be taken *cum grano salis*, for they are apt to attribute to the fish of the Wye not only superior freshness, but quality, as an inducement to purchase by their customers. Some twenty years ago I hooked what appeared to me a fish of this kind, between 2 and 3 lbs., at Monnington rocks on the Wye, in this county, having an ocular inspection of his outline by holding him in the water for half an hour and bringing him near shore more than once, and from his leaping upwards when hooked—a fact peculiar to the sewin when in season; but at last, I presume, not liking his proximity to dry land, he made a last effort and plunged upwards out of his element, seeming to say "I give you notice to quit," and away he went, with a portion of the line and two other flies attached, thus cheating me of the opportunity of examining his osteology.

In reference to the very interesting experiments near Perth, Sir W. J. observes "will prove in May next whether any portion of the brood of young salmon will assume the migratory dress within the twelve or thirteen months." According to what I have observed from the experiments of Shaw, Young, and those at Stormontfield, it appeared to me that though that assumption of dress occurred usually in two years, there were some, more forwardly developed than the rest, that did assume this particular costume at a little more than twelve months old. However, it is gratifying to one like your humble servant, who fifteen or sixteen years ago endeavoured to prove by papers read before the Natural History Institution of this city (and which was then considered to be an ichthyological heresy), that the small fish called variously par, lastspring, samlet, &c., a supposed hitherto distinct species, was the real offspring of the salmon—but denied by Sir W. J. and others, "distinguished naturalist" though he be—that is not now a question, but at what particular age do they arrive at the natural instinct which directs them seaward.

Although this subject has been before discussed in your extensively circulated periodical, you may be of opinion that correct notions of natural history, and that regarding one of our most valuable fishes, cannot be too often laid before the public. Even so late as four years ago, a certain Archdeacon of Wales, in a correspondence with me and the author of the "Rod and Line" in your paper, maintained the old theory; but I presume that venerable and learned gentleman, with that candour evidencing an inquiring mind, has recanted his error.

T. JENKINS.

HEREFORD, *5th Nov.*, 1856.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING,

JANUARY 19TH, 1857.

The Annual Meeting was held on Monday, January 19th, at the residence of the Hon. Secretary, Mr. J. A. F. Suter, in this City. Mr. Hewett Wheatley, the President, took the Chair. The Hon. Secretary read a statement of the accounts, which showed a balance in hand of about £34. It was resolved, pursuant to Rule XII, to strike off from the list of members all who have been in arrear with their subscriptions since 1852 and 1853. This resolution left eight vacancies, two of which were filled up by the election of Mr. Cocking of Ludlow, and Mr. Alfred Purchas, of Ross; several other gentlemen were nominated. The latter will be balloted for at the first Field Meeting.

Dr. Bevan of Beaufort then read a very able and instructive paper on the Field Meeting of the Club at Abergavenny in October last, and on the Geology of the adjoining portion of the South Wales Coal-field, with the overlying beds of the Millstone Grit and Mountain Limestone formations.

The President (on resigning the Chair at the close of his year of office) delivered an excellent address, pointing out the importance, socially, morally, and religiously, of naturalistic pursuits, and indicating the advantages which would flow from the formation of the contemplated Museum. He then glanced at the subject of Ichthyology, remarking that the recent experiments at Stormontfield, Perthshire, as described by Sir Wm. Jardine and other eminent naturalists, had brought to light a most remarkable fact in regard to the Salmonidæ, which had led him (the President) to modify some of the opinions expressed in the paper on "the Ichthyology of Herefordshire," read by him at a former meeting (see *antea*, page 64). It has been ascertained that a part of the salmon hatched at one time make their way to the sea at the end of the first twelvemonth, while the rest do not migrate until the end of the second year. This circumstance could not be accounted for by the consideration of sex, as both male and female were among those who migrated at the end of the first year, although it might possibly be that the females were a year older than males, since it was well established that the male salmon reaches maturity much sooner than the female. This question, however, will probably be set at rest by further observation.

Experiments are being made to ascertain also whether, by supplying the young fish with abundant food, they may not be all so far advanced in growth as to be ready to depart for the sea at the end of the first year.

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The President concluded by briefly reviewing the Field Meetings of the year, recommending the further investigation of the interesting question as to the Drift of the valleys of the Wye and the Lugg, which was discussed at the Bromyard meeting; passing a deserved compliment to the researches of Mr. Banks, of Kington, in reference to that huge crustacean, the *Pterygotus*, once an inhabitant of the Old Red seas; and finally glancing at the highly interesting meeting held at Abergavenny, and the valuable paper on that subject just read by Dr. Bevan.

In conclusion, Mr. Wheatley alluded to the paper read at the last Annual Meeting by Mr. Flavell Edmunds, on the sudden appearance of certain plants, new to the immediate district, on the spoil heaps and embankments of the railway works (see *antea*, page 142). Since then, he understood from Mr. Edmunds, that nearly all those plants had disappeared; and he (the President) thought the fact was worthy of record, while it certainly seemed to justify the theory of Mr. Edmunds that the plants had been produced from long-buried seeds. The President quoted some other instances of germination after the seeds of plants had been buried for a very long period of time; and then added that he understood that Mr. Edmunds had found Scrophularia Ehrhardti at Huntington, and Mellilotus officinalis and Adoxa moschatellina at Hunderton—both plants which had not previously (he believed) been found in the Hereford district, although common in distant parts of the county.

After thanking the members for the honour conferred upon him, and expressing his ardent desire for the continued usefulness and prosperity of the Club, the President concluded amid applause.

It was resolved that the addresses of the President and of his immediate predecessor in office (the Rev. J. F. Crouch) together with Dr. Bevan's paper, form the second part of the Club's Transactions, which will be forthwith placed in the hands of the printer, so as to be ready for delivery to the members in the course of the ensuing season.

Mr. Charles Lingen, of Hereford, was then unanimously elected President for the year 1857-8; and the Field Meetings were fixed for

Tuesday, June 2nd, at Fownhope;
" July 21st, at Ludlow;
" August 25th, at Westhide.

The programme for the third meeting was arranged so as to include the Silurian formations at Shucknall, the Dormington landslip, &c., the Bartestree trap-dyke, and the Hagley dome, the party returning to Hereford to dinner.

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ADDRESS

Read before the Members of the WOOLHOPE NATURALISTS' FIELD CLUB, at their Annual Meeting, held in Hereford, January 19th, 1857, by HEWETT WHEATLEY, ESQ., President.

GENTLEMEN.—A blind man may be led through a picture gallery, and therefore truly say—I have been there! How many who possess the blessing of sight, thus walk through nature during a long life, and all they can do at last is to whimper out—we have been there! Such societies as ours tend directly to the repression of that great evil, intellect unexercised. By such societies many a germ that might otherwise have remained dormant, may be fostered into vitality. By such, may old misunderstandings be uprooted, and planting new ones be avoided—the purely fanciful be exposed—the hint of former days investigated—and true theories be built on the only sure foundation—practical labour. Instead of first inventing a system, and then, with every paternal predisposition in its favour—with atom after atom piled up by vanity to substantiate it, nature is herself distorted to support imagination—instead of this, we practise first and theorize afterwards. The child of solitude, the offspring of fancy, born in the student's closet, can never be the true interpreter of any one page in the volume of Natural History. No! We must go forth unbiased by preconception, and—hardest lesson of all—isolating oneself from self—thus must we go forth into nature—air, earth, rock, and water our books, and God our teacher; thus must we go forth—see, labour, and then decide. The very title of our Society inculcates this doctrine—THE NATURALISTS' FIELD CLUB. It extends our operations—our active and practical operations—over many branches; from the insect that sports its life of an hour—from the humblest herb that rejoices in the glorious light of Heaven—to the vast marvels of geology—to the sublimity of the Great Creator's works. I repeat, it extends our practical operations; and herein, the superiority of these Societies. There is less risk of hasty and rash decisions—*quod cito fit, cito perit.* Theophrastus doubted the wondrous architecture of the universe, because he imagined that the luminous appearance from the stars of the galaxy was nothing but the light which shone through a crevice of the badly joined hemispheres! The wildest of modern theorists would have been hissed for such an absurdity: yet there is no inconsiderable amount of error to be overcome, not less than of discoveries to be made; and of those already made, to be further illustrated and confirmed.

Though I cannot consider mind as cumulative, science certainly is; and the annual publication of scientific papers, in connection with the transactions of each Society, is commendable and useful. But there is another source of utility, both highly interesting and highly instructive, and whose benefits are as obvious as those of the steam engine and the gas lamp—a judiciously selected and well kept Museum; the formation of which is contemplated by this Club; and will, I trust, be carried out with equal liberality and clearness of detail.

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The intention is, that such a repository of specimens shall be strictly local—strictly confined to the district worked by the members of the Woolhope Club. This feature is peculiarly adapted to the true aims of such institutions; and those aims appear to me, to be stimulative and educational. General collections, like general remarks, rather insinuate than assert; and seem too vague for individual purposes. We rove from here to our antipodes; we circumnavigate the globe; we pierce the jungle, and brave the rigours of ice—producing collections of the utmost splendour. They are magnificent—they are worthy of high civilization. But how few visit them with any other object than the gratification of curiosity, or at best, a general and fugitive recognition of the wonders of Creation. Their scope is far too vast for every day life; they may shed lustre over the collectors, and they may adorn a nation, without furnishing one suggestion of practical value, or one incitement to systematically scientific research. But a *local* Museum possesses attractions peculiarly its own, and peculiarly suggestive. We there see not only the produce of earth, air, and water, but more immediately, of our own earth, air, and water—of our own native place, or the place of our predilections. Even as strangers, we cannot view such a collection without curbing all rambling propensities—without the idea arising that all we see was gathered here—here, within a very narrow zone—here, from the waters which flow through our own lands—from the air which passes over this very spot—from the earth on which we are treading. Sympathy is aroused—emulation stimulated. Further (and what I conceive to be one of the chief practical uses of a Museum), the student, desirous of consulting the highest authority on any subject embraced by the collectors, can here satisfy his doubts—glean important information—and scattering the chaff of false theories to the four winds of heaven, store up the golden grains of truth. And may not all this be obtained through the medium of books? I doubt whether as efficiently; for where the eye ministers to the understanding, there is less room for conjecture, and consequently less chance of error. There is perhaps, too, some difficulty in separating the true from the false, in books; while in such collections as you propose, *all is truth*—each specimen is a spark drawn from nature; there is none of that Chinese-slipper work, which is all very well in a curiosity shop; but aiming at something higher and better, the student will here contemplate nature as framed by the Great Creator's hand—thence drawing his own conclusions, unswayed by the bias of a human teacher.

To facilitate its educational purpose, I think every specimen should be accompanied by a statement (which might be comprised in two or three lines), of the order and family to which it belongs; together with any marked peculiarity attending it—its most striking character, whether as an individual specimen, or one of a group. A descriptive catalogue would also be of some assistance; more particularly with a short prefix of each science—confined to what is known and proved, excluding the merely conjectural.

Thus it appears to me, would the labours of our Field Club not only redound to their own credit, but aid in developing—and very largely too—the truths, the beauties, and the admirably designed harmony of creation.

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There is one branch of our pursuits, however, which does not admit of pecimens, in the usual sense of the word—Meteorology. Yet it might be represented in your Museum—and I think ought to be—by preserving a copy of each month's observations; together with such periodical comments as the observer might find cause to make. Nor is this by any means a subject of minor importance; for since every creature that breathes, and every blade of vegetation which either delights the eye by its beauty, or the mind for its usefulness, is dependent on Meteorological elements—surely an endeavour to ascertain the causes and the laws of atmospheric variation should stand in the foremost rank of science; especially on considering that such knowledge may, and I believe must, tend to elucidate some of the hidden phenomena of disease, both in the animal and the vegetable worlds. And I incline to agree with a late writer in the North British Review—however bold may sound his assertion,—"that had Hipparchus and Ptolemy made hourly observations, and had their contemporaries and successors in different parts of the world done the same, we might now have been predicting the weather with as much certainty as we do the planetary motions." Light is, however, beginning to break in upon us—order arising out of seeming irregularity—for seeming it only is:—

> "All Nature is but Art unknown to thee,
> All Chance, Direction which thou can'st not see."

What Geology has done and is doing for the earth, Meteorology will do for the air; the one has unveiled some of the great mysteries of ages—of the very existence of which few ever dreamed; the other will develop secrets of the atmosphere whose benefits can hardly yet be estimated—or overestimated.

Even from the slight sketch I have given of your projected Museum, I think it will appear that the County of Hereford, and the adjoining district, are peculiarly interested in its establishment; and I earnestly hope, that on appealing for support, it will not be denied. For two or three considerations only, I cannot but deem that support certain. In the first place, our Club, with few exceptions, is composed of Hereford and Herefordshire men. Next, they are, for the most part, men practically following out some specific branch of knowledge. Among them are those who rank high in the world of science; and others who energetically following their philosophic vocation, are not the less valuable in the class of the scientific, though they may not have attained the same distinction; those who ably back an able general, share their leader's renown. Add to this the fact, that I believe all who have formed, or are forming, local collections of Natural History, in its branches of Geology, Botany, Ornithology, Zoology, Entomology, and Ichthyology, have promised to place such collections in the Museum of the Woolhope Naturalists' Field Club. Though I am not, myself, a native of your city or county, I cannot help speaking strongly on this subject; and say, emphatically, to both county and city, that if you would reflect honour on yourselves—if you would hold out the right hand of fellowship to native talent—if you would mark your approbation of contemporary mind and merit—and if you would encourage in the rising generation a desire to emulate and to surpass its predecessors—you ought to support a Museum, dedicated to the illustration of

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your own native place, in the whole range of its Natural History. I would merely further say that we should recognize the broad principles of independence and liberality; I mean, that your Museum, essentially local in character, should be kept distinct—unfettered by association with any other—else would it in a great measure lose its characteristic. It should be on a liberal basis too. Nothing whatever of selfishness should taint the course of education and science; therefore should freedom of access, at all reasonable hours, be secured to the public; otherways would its usefulness be "cribbed, cabined, and confined."

As a stranger, I ought, perhaps, to apologise for urging this subject; but as one of the Committee, I deemed it my duty. It is moreover the cause of knowledge in general, though sought to be effected by local means.

In consequence of the favour you did me in publishing a paper on the Ichthyology of Herefordshire, I may be allowed an observation or two on that topic. I have been told Sir William Jardine had remarked that, in consequence of subsequent discoveries, I must greatly modify my own views on the natural history of the Salmon. I had the pleasure, a short time ago, of receiving from Sir William his paper on the subject; and I must freely confess, that if I were not absolutely wrong in *toto*, I was only partly right. The experiments recorded by Sir William, as carried on at Stormontfield, with the greatest care, shew the remarkable fact, that *part* of a brood of Salmon goes down to the sea for the first time, the spring after they are hatched—that is to say, a little more than a year old—while the remainder of the same hatch neither assume their migratory dress nor exhibit migratory inclinations till the second spring; whereas I asserted, generally, that the young did not leave their native rivers till the second spring. Having noticed multitudes thus acting, I concluded—and now it appears rashly—that all were influenced by the causes which operated on about the half of them.

Why this should be so is at present merely conjectural. It is clear that age has nothing to do with it; since parts of the same brood seek the sea at very different ages. It might be attributable to sex; for the male we know to be perfect (for all purposes connected with impregnation) long before the female, and might consequently be fitted for his sea-destination before her. But we meet with both males and females travelling together down the rivers; it may be, however, that the females were those which were hatched two years before, and the males only one year. The question can be very easily settled at Stormontfield by noticing whether males only migrate the first year. An experiment, I believe, is also going to be tried there, with reference to the effect of feeding; whether, by furnishing the young with as much food as they can consume, *all* cannot be advanced to the migratory stage the first year. Should this be the result, it will go far toward clearing up the present embarrassment; for we might thence naturally conclude that the earliest migrators from their native streams were those who had obtained the larger amount of food, either from their being stronger than their brethren, or from any other cause. That fish, especially fish of prey, can be very rapidly increased in size by an unlimited supply from the commissariat department, is certain; but I am inclined to look to some fixed law influencing the instinct of migration, rather than to any precarious source.

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To give any summary of the Meetings of the Club for the past year, I am unfortunately very ill qualified, in consequence of absence on those occasions. This, however, cannot be regretted. The benefit is yours; since the excursion to Abergavenny, in September, appears to have been the most interesting, and a narration of which, I am happy to say, is in far abler hands—Dr. Bevan having kindly consented to add to our annals an account of that day's proceedings, and which we have just had the pleasure of hearing.

If the Meeting at Bromyard, in June, afforded neither geological nor botanical specimen of rarity, it produced a discussion on the extent and nature of the drift in the valleys of the Wye and Lugg; and I cannot but think the topic of sufficient local scientific interest to deserve investigation and a place in our Transactions.

The other Meeting, at Kington, in July, was more prolific in specimens. The Geologist found a great abundance of fossils; the most interesting of which was the finest specimen supposed to have been ever found of the swimming feet and pincers of that large crustacean, the Pterygotus Anglicus. Mr. Flavell Edmunds has also found Scrophularia Ehrhardti, at Huntington, not a very common plant anywhere—and hitherto, I understand, unobserved here; also, an Adoxa Moschatellina, at Hunderton; which, though previously not noticed here, is abundant in the southern parts of the county. It will be remembered, this gentleman read a paper at our last Annual Meeting on the sudden appearance of plants new to the locality, on the railway embankments near Hereford. He has since then remarked their as sudden disappearance; which he considers to establish his theory that they sprang from buried seeds. The Rev. Mr. Crouch found Hyoscyamus niger at Pembridge, under somewhat analagous circumstances —on digging down to an old drain, the soil with which it was again covered over produced from 30 to 40 plants. On the soil which re-covered a grave that had been recently dug, and which apparantly had not been disturbed for many years, he also noticed the same plant. Though there does not seem any reason why this particular vegetable production should not be indigenous, Mr. Crouch's efforts to discover a specimen in the neighbourhood have never been successful. It is not an uncommon occurrence for large tracts of the North American forests to be consumed by accidental fires, when a similar phenomenon occurs by the springing up of trees wholly dissimilar in kinds to those destroyed, and which is usually attributed to the vivification of long buried seeds. There is one instance on record of the strawberry appearing under such circumstances, in a locality where it was never previously known to have existed. We may well understand the possibility of these occurrences, since seeds, affirmed to have been found in the catacombs of Egypt, have fructified; and since a material of such delicacy as the mere pollen of a plant will retain its fertilizing powers for eighteen years—and probably very much longer. This is said of the Chamœrops humilis—the common European palm. The facts are curious; and as Mr. Edmunds has favoured me with a list of the plants he found under the above conditions—eight in number—I have added them below.

Hyoscyamus niger.
Carduus Marianus.

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Lamium inclsum.
Matricaria Parthenium.
Chrysanthemum segetum.
Armoracia vulgaris.
Veronica cœspitosa.
Jasminum orientale.

As these Field Meetings only occur on three days in the year, many important discoveries are not, on such occasions, to be expected. They may be considered as tending to keep up and augment an interest in scientific pursuits—as relaxations, rather than periods of work—though work does form a portion of the day. But their great charm is not only in visiting beautiful or interesting localities—not only in geological and botanical investigations—but in the associating together a few men of congenial pursuits—in the collision of minds embued with the true spirit of a philosophy, founded on the glorious and mighty works of Omnipotence.

And now, gentlemen, I have to return you my cordial and hearty thanks for the honour you last year conferred upon me, in electing me your President, and to resign the office into your hands. I can only say, that inattentively and inefficiently as I have fulfilled the functions of the station to which you last year called me, yet will I yield to no man in respect for the talent which adorns our Club; nor in the honest and sincere desire for its continued prosperity and usefulness. I will, therefore, conclude with one single word—the "strange device" on the banner of Longfellow's pilgrim—"Excelsior."

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ON THE GEOLOGY OF THE COAL FIELDS.

In the neighbourhood of BEAUFORT, Monmouthshire, by G. P. BEVAN, ESQ., M.D., F.G.S. Read at the ANNUAL MEETING of the WOOLHOPE NATURALISTS' FIELD CLUB, Hereford, January 19th, 1857.

GENTLEMEN,—At the Autumn Meeting of the Members of the Woolhope Club, held at Abergavenny, on October 14th, I was requested to draw up a slight sketch of the proceedings of the day, and of the country through which our day's excursion extended. I have felt very diffident about writing this report, feeling that the Geology of the district would have been much fuller and more scientifically described by many of our members, and my sole reason for agreeing to do so has been that as regards the *locale* and physical features, I am perhaps better acquainted with the neighbourhood than any other member of the Club. I ought to be so, for during the six years that I have resided in Beaufort I have spent nearly three in endeavouring, as far as my other duties would allow time, to become acquainted with the many geological curiosities of this highly interesting district; a district—with the exception by a friend who has lately left, and myself—almost unworked and unknown, and yet so prolific in all its fossil flora and fauna, as to rival the most celebrated localities; and I assure you that I felt no ordinary pleasure in being the means of introducing our Club to a maiden country, and which, I trust, will induce many—especially those who live nearest—to assist in its geological development.

Before I commence our day's excursion, I must throw myself on the indulgence of the Club, to excuse my errors of geology, my knowledge of which, were it not for the reasons I have before stated, would not be an excuse for my writing a paper on it.

Our meet then, was at Abergavenny, situate in the heart of the Old Red Sandstone, and commanding the most lovely views up and down the Vale of Usk. Although a place which makes the heart of the sketcher glad ,I fear it will not reward the fossil collector for a long day's work; the sole fossils found there having been a couple of fishes, viz., the ctenacanthus ornatus and the ptycacanthus dubius. As to the precise spot where these were found, they are both "dubius" to me, but I doubt not that Abergavenny will yield as many fishes as Herefordshire, when they are searched for. Looking up the Vale of Usk towards Crickhowell, we see on the right the Old Red groups of the Sugar Loaf and the Daren. On this last, Sir R. Murchison found a portion of the Holoptychius nobilissimus. I have often looked ior another, but the deeply peroxidised stones never disclosed anything to my gaze. On the left we see a very different system, viz., the escarpment of the Mountain Limestone, the great northern belt of the South Wales Coal field. At the furthest end of the valley, although only visible from the hills around, we see the Brecon Beacons, the highest of the Old Red range, attaining an altitude of 2682 feet.* Owing to the small angle of dip,

* In the New Series Ordnance Map, Sheet 213, Pen-y-fan is given 2907 feet, and Corn-ddu 2863 feet.—*Editor.*

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the continuation of beds, which form the summit of the Vans is only a few feet below the Carboniferous Limestone at Merthyr, which Sir H. De la Beche supposes may have covered the Vans, just as it does the opposite height of Pen-ceryg-calch. One can well imagine the denudation of the soft marls, leaving the harder Conglomerate untouched, for even at the present day the rivers of the district, when swollen after a storm, bring down enormous quantities of red marl, presenting a nearly bloody appearance. Our way then lay under the hills of Mountain Limestone for about four miles, until we arrived at Gilwern, where we abruptly turned from the valley of the Usk, and entered the South Wales Coal field, through the picturesque gorge of the Clydach. The road soon becomes deeply interesting, both artistically and geologically—winding through the narrow valley, with the Clydach foaming below—the escarpments of the Limestone are seen towering above us—while on the left the light of innumerable fires, and the roar and clank of engines, tell us that we have left the agricultural for manufacturing districts. The Llanelly works are placed in a deep dingle, bounded on both sides by the limestone, which is extensively worked to assist in the reduction of the iron ore; while on the hill towards the south, numerous chimneys are scattered, marking the shafts of the pits. In the Geological Survey, vol. I., page 149, is seen an interesting account of a visit made by Llwyd in 1697, to Llanelly, in which he describes the mode of working the pits and levels, and also the discovery of the stigmaria, which seemed to perplex him much.

After descending to visit the Pwl-y-cwm waterfall, we mounted the hills directly above us, and commenced an examination of the limestone quarries. We are now standing on the thin belt which immediately surrounds the South Wales Coal field. Running up from Pontypool to Abergavenny, it forms the range of the Blorenge mountain, at which point it turns and runs due west to Carmarthen Bay. From Pontypool to this latter place there is a gradual diminution of the thickness of the mass, preparing us for the final disappearance of the same range of beds in Pembrokeshire. There is also a change in the character of the beds—the lower shales, which are so conspicuous in the south border of the Coal field, have disappeared, except now and then in the gullies and ravines. The limestone is much worked on the whole of the Pengwern mountain— the thickness at Llangattock being about 520 feet. The lowest beds consist of a hard grey crystalline-looking stone, containing but few fossils. In the upper beds I have found large quantities of corals, and in small thin partings of blue shale, great numbers of producti in tolerable preservation—euomphalus, phanerotinus nudus, different varieties of lithodendron and fungites, and a few leptænæ. In the lower beds at Llangattock the prevailing form is spirifer. Continuing our course westward from Llanelly or Llangattock, we do not get any more sections of limestone until we arrive at the Trefil quarries, near Tredegar. They are of enormous extent, and worked as it were in terraces, so that an easy descent can be made from the top to the bottom beds. The junction of the Millstone Grit is here extremely well marked. Boulders of quartzose grit overhang the edges of the upper beds, frequently rolling over and being mixed with the limestone. These quarries are not so rich in fossils as those at Llanelly. I have found productus giganticus very perfect—some good specimens of lithodendron—rhynconella, and a number of casts of euomphalus filled with spar.

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Further on we arrive at the quarries of Dyffryn Crownan, which I have examined, and did not find a single specimen of any sort, seeming as if they decreased as the range went further west. Dyffryn Crownan is, however, well worth a visit. It is a narrow gorge of horse-shoe shape, above which the limestone rocks tower precipitously, and forming one of the most lovely views in South Wales, although it is so remote from any tourist track, that I question whether it is known by fifty people in the county. Geologically it is interesting, as affording the most perfect junction line with the Old Red Sandstone that I ever saw; so exactly is it marked that a person could almost make a circuit of the gorge, and trace it with a spade. The next section displayed is that of the Rhymney quarries, in the Valley of the Taff Vechan; followed by the Penydarren quarries to the north of Merthyr; but as I have not examined any of them, I merely mention them as a guide to anybody who might wish to visit the whole series.

Retracing our steps to Beaufort from the Trefil, a fine and instructive view is gained. To the north we see, in the horizon, the undulating Silurian hills about Builth and Radnor Forest. To the left the Old Red Sandstone of the Beacons tower up. Right opposite us we have the whole range of the Black Mountains and Pen-ceryg-calch, with its isolated covering of Grit and Limestone, like that on which we stand. Far in the distance to the north-east, the Malverns show their plutonic heads. That faint smoke in the far east is the Forest of Dean Coal field, once allied to our own. Looking to the south, we are struck with the parallel edges of the Pennant grit, and between us and them the dense smoke points out the site of the busy iron works. If it is very clear, we may see beyond it all the Mountain Limestone of the Mendip range in Somersetshire. Again, I do not know who would be most pleased—the artist or geologist. I think they should always go together, for the scenery that delights the eye is generally one of scientific interest. This rule, however, will not apply to the Coal Measures, more particularly to those of Beaufort, which we are now entering. The surface on which we are now standing is a vast slope of Millstone Grit or Farewell rock, which, by the bye, is wrongly coloured in the Ordnance map, in which a considerable district is marked as Coal Measures, whereas it is Millstone Grit. As a rock, it is here as elsewhere, an excessively hard material, almost destitute of fossil remains. Although the name "Farewell rock" implies to the collier that there is no more coal to be found underneath, that is not the fact, for there are occasional seams, termed Rosser veins, to which I shall more particularly allude. The following section will describe the Millstone Grit, in about eighty yards of thickness.

Sandstone.
Strong white sandstone.
Sandstone and argillaceous shale.
Sandstone.
Argillaceous shale.
Coal, 4 in.
Sandstone and shale beds.
Coal, 1 ft. 6 in.

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Blue sandstone.
Brown sandstone.
Argillaceous shale, with small pins of ironstone.
Strong grey sandstone.
Dark sandstone and argillaceous shale.
Dark grey sandstone.
Light brown sandstone.
Conglomerate or plum pudding stone.

This section I have obtained from that of the Ebbwvale measures. One peculiarity of this district is, the immense quantity of sulphuret of iron contained in it, the decomposition of which gives rise to numerous chalybeate springs. One about two miles from my house, contains iron and sulphurretted hydrogen in such quantities as to taint the air immediately around it.

At first view of the Coal district, one is struck with the parallel ridges of sandstone running south, and forming the equivalent of the Pennant grit. They are a marked feature in the whole of the South Wales Coal field. Commencing at Llanelly, Caermarthenshire, they run east to Swansea, where they attain the great thickness of 2125 feet, and from thence may be easily traced to Pontypool, running in parallel ridges due north and south. The denudations which have acted on the softer shales below, have been resisted by this hard rock. According to Sir H. De la Beche, they are formed in the following manner:—he considers the principal mass of sand to have been forced along the bottom by the pressure and movement of superincumbent water, but little having been thrown down in plane horizontal surfaces from mechanical suspension in the water. It is a kind of deposit which, if the sand be readily supplied, may be effected in very shallow water; and hence, by continued subsidence, a very great thickness might be eventually obtained. There are but few coal seams in this rock, at least with us, but at the Town Hill, at Swansea, there are, by Mr. Logan's section, at least twelve seams of considerable thickness, accompanied by their underclay and a considerable amount of shale. At Ebbwvale we find it of a thickness of 330 yards, consisting of

Sandstone, with thin seams of coal and underclay.
Troed y rhiw coal, 2 ft. 4 in.
Underclay.
Sandstone.
Coal, 1 ft. 6 in.
Carbonaceous shale.
Sandstone.
Coal, 1 ft. 2 in.
Underclay.
Shale, continued seams of coal, and underclay.
Argillaceous shale continued, pins of ore.
Oldman's coal, 2 ft. 4 in.
Underclay.

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Thin seams of black band.
Sandstone and shale.
Coal, 2 ft.
Sandstone and shale.

We therefore find here five seams of coal, of different thickness, with their underclay. The vegetation is often abundant in the Pennant grit; confined stems and stalks, accompanied by multitudes of small leaves, generally very faint, and covered with carbonaceous specks, are most usually seen. I cannot quite reconcile to myself the appearance of the vegetation, with the continued and quiet subsidence which the formation betokens, for the former appears to bear marks of great violence and confusion, unless it be that it has been carried along by the water until entangled by the sand, and subsided with it.

Descending from the heights of the Pennant rock, we come upon the actual Coal Measures, and I purpose giving you a brief section of the coal and iron veins at Beaufort and Ebbwvale—not so much a recapitulation of the vertical sections published by the Survey, as with a view to naming the different fossils peculiar to each vein. Few coal fossils (veritably coal and iron), have been figured, with the exception of the fossil Flora, which Lindley and Hutton, and after them Brogniart, have fully elucidated. The principal description has been by Mr. Prestwich, in his account of Coalbrook Dale (Geological Transactions, vol. 5), but there are not many figured even there. I have found but few seams without a distinctive shell; some so distinctive that I can tell the measure to which the rubbish tip belongs, by the shell—and within the last year I have found more than forty species in Beaufort and Ebbwvale.

EBBWVALE SECTIONS.

Coal, 1ft.
Coal, 1ft. 6in.
Black pins (ore).
Coal, 4 in.
Elled coal, 3 ft. 4 in.
Coal, 1 ft. 6 in.
Big vein coal, 4 ft. 9 in.
Three quarter coal, 3 ft. 4 in.
Coal, 1 ft. 3 in.
Coal, 8½ in.
Coal, 7 in.
Coal, 11 in.
Bydyllog coal, 3 ft. 9 in.
Daren pins (ore).
Engine vein coal, 5 ft. 9.in.
Golin goch bach coal, 1 ft. 6 in.
Coal, 1 ft. 2 in.
Yard coal, 3 ft. 2 in.
Black band (ore).
Old coal, 5 ft. 6 in.
Coal, 5 in.
Red vein (ore).
Spotted vein (ore).
Big vein (ore).
Bottom vein coal, 2 ft.

I have, of course, left out in these sections all the intervening courses of shale, sandstones, &c., as uninteresting, and merely confined myself to the seams themselves.

At Beaufort the section is not so long; we have

Pin Will shone, 6 in.
Coal, 6 in.
Coal, 6 in.
Old coal, 4 ft. 8 in.

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Course of mine, 3 in.
Bydyllog coal, 3.
Little pins (ore), 4 in.
Gloin goch bach coal, 1 ft. 9 in.
Yard coal, 3 ft. 3 in.
Small pins (mine), 3 in.
Coal, 9 in.
Rock vein (mine), 4 in.
Chance pins (mine), 2 in.
Red vein (mine), 7 in.
Spotted pins (mine), 3 in.
Yellow vein pin (mine), 3 in.
Yellow vein (mine), 4 in.
Big vein coal, 1 ft.

Allowing for difference of names, especially in the courses of mine, we have pretty well the same thickness and order in the two places.

The Elled vein of coal is worked on the hill between Nantyglo and Beaufort, from above ground, the appearance of which, I dare say, everybody who was present will remember, as it was the only "patch" (locally so termed) that we visited on our way back to Brynmawr. We observed from above downwards, the top clay and sandstones, succeeded by large balls of ironstone, in tolerably regular layers, which, when broken, present beautiful little quartz crystals (termed Welsh diamonds), imbedded in the interstices; below this was a large amount of shale, which, perhaps, contains a more valuable fossil flora in a small space, than any place known. Although in great confusion, yet the beautiful preservation of the ferns, coupled with the utter absence of fish and shells, point out at once, that in this case, we cannot account for this growth by any drift theory—but that they grew there is plain; for, I daresay, the members will remember seeing one or two fossil trees erect, running up through the shale into the iron ore.

The following is a list of ferns that I have collected, in conjunction with a friend, the Rev. S. Lucas, a Fellow of the Geological Society, whose departure from the county I lamented very much. I must not forget to mention my head gardener, whose knowledge and interest in his vocation has procured me many good specimens.

Annularia brevifolia.
Asterophyllites foliosus.
" Parkinsoni.
" longifolius.
Araucaria.
Calamites approximatus.
" cannœformis.
" Suckovii.
Fructification of an Equisetaceous plant.
Hippurites longifolia.
Knorria imbricata.
Lepidodendron crenatum.
" elegans.
" minus.
" Sternbergii.
" plumosum.
Lepidostrobus.
Pecopteris dilatata.
" cistii.
" caudata.
" laciniata.
" Mantelli.
" nervosa.
" repanda.
" serra.
" Stutgardiensis.
" urophylla.
Pinnularia capillacea.
Pterophyllum.
Sigillaria flexuosa.
" oculatum.
" pachyderma.
" reniformis.
" tesselata.

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Neuropteris acuminata.	Stigmaria.
„ gigantea.	Sphenopteris caudata.
„ heterophylla.	„ crenata.
„ macrophylla.	„ dilatata.
Pecopteris adiantoides.	„ elegans.
„ dentata.	„ latifolia.
„ denticulata.	„ macilenta.

In the black pins, which is a course of mine above the Elled, I have found two species of unio, or, I suppose, anthracosia—for I am not aware whether that name is applied by Capt. Brown to the whole tribe of uniones, or merely to shells termed anthracosia agrestis. To descend. In the three quarter coal, Mr. Adams, of Ebbwvale Works, to whom I am indebted for much information, has found terebratula, as also in the Bydyllog coal. In the Daren pins, next in order, three species of uniones—one of which is very small. In the black band we have found a large unio, quite different from those of the Daren pins, and a species of rhynconella. In the red vein, unio, and a small modiola, associated with quantities of lepidodendron. The bottom vein of coal is the most important, as containing shells, viz., microconchus, or spirorbis carbonarius, and great quantities of anthracosia agrestis, teeth, scales, lower maxillary jaw, palates, pectoral rays, skin, bones, and heteroceral tails of an (to me) unknown fish or fishes, and a tooth of the megalicthys.*

I have found no fishes above the bottom vein; I suspect the reason is that the waters at the time when these upper measures were formed, were shallow and fresh, and this I conclude to be the case, on account of the uniones and fresh water shells, which we find in these upper measures; as also from the ground tracks of worms, which are abundant, and the discovery of a large nereites, plainly indicating a shallow and muddy shore. The remains found in the bottom vein seem to indicate deeper waters, more nearly approaching the deep sea waters, in which the shells of the Rosser veins lived.

The nereites to which I have alluded, I found on a slab of hard stone, from between the coal seams, and used for building materials. It is curved once or twice, and in length about two feet, *i.e.*, as much as I found of it; and as the breadth does not seem to dinimish at either end, there may be as much more again. It consists apparently of a thin vertebra, with a multitude of small spiculæ, like fish bones, on each side of it, for its whole length. It is not at all unlike the nereites Cambrensis, as figured in Siluria, but is apparently much larger, and of more regular structure. As the specimen itself is very heavy, I have succeeded in getting a tolerably exact photograph of it. I have alluded before to the Rosser veins—the small seams found in the Millstone Grit. In the dingle running up into the heart of the mountains from my house, and called Cwm Carnol in the Ordnance map, I have discovered a great number of shells. These seams of coal and iron mines are but little worked—they appear incidental, like the veins in the Pennant rock—but it is singular that in all the Rosser veins I have found traces

* Since writing the above, I have found the fish remains to belong to the Palæoniscus, Cœlacanthus, Holoptychius, and Megalicthys.

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of shells of a deep sea character, and which bear such a similarity to the shells of the Mountain Limestone below, that I look upon them as a sort of transition bed. Another curious and suggestive fact is, that in all the sections there is no mention made of any underclay to these veins, while above—even in the Pennant rock—there is no coal without it. In the coal seams I have found wings of insects; something very like the body of a dragon fly; another nondescript like a small paddle with five toes—lingula, leptæna, producta and conularia (perhaps quadrisulcata). In a small measure of ironstone, at the very head of the dingle, I have obtained

Productus giganticus and another species.
Rhynconella.
Leptæna tenuistriata and one other.
Terebratula.
Spirifer, three or four varieties.
Strophomena depressa and another sort.
Lingula mytiloides, and another sort.
Orthis.
Donax sulcata.
Nucula acuta.
„ æqualis.
„ accipiens.
Pecten scalaris.
„ gentilis.
Mytilus triangularis.
Modiola.
Unio aquilinus.
„ robustus.
Bellerophon hiulcus, and two other varieties.
Nautilus.
Littorina obscura.
Goniatites Listeri.
Turritella minima.

and another variety so small that it is impossible to make it out without a magnifying glass. All these shells are in ironstone and ferruginous clay, and some of them—especially the small ones—glitter like gold with their polish of iron pyrites.

After considering all these different measures and their remains, the truth of what Sir R. Murchison says is very evident. He says: "In geology, less indeed than in other sciences, can we ever hope to account for certain rssults by one 'modus operandi' only. For nature seems to have worked out phenomena apparently similar, through distinct paths, and by devious processes and of this no clearer proof can be given than that coal was formed out of vegetables, which were accumulated by at least two methods."

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, TUESDAY, JUNE 2ND 1857.

TARRINGTON.

Tuesday, June 2nd, being the day appointed for the Joint Meeting of the Woolhope and Malvern Field Clubs at Tarrington, there was a good muster of visitors to that pretty and picturesquely situated village.

The Hereford party, which started at 8 a.m., filled one of Messrs. Bosleys' stage-coaches, and a second party, which started at 10 a.m., on the arrival of the morning trains, occupied two other carriages. A party of members of the Malvern Club made their appearance at Tarrington soon after the arrival of the first Hereford party; and other naturalists arrived afterwards from other parts of the county.

After breakfast, the Woolhope Club held its Meeting, and transacted its ordinary business, the chair being occupied by Mr. C. Lingen, of Hereford, President of the Society.

The members of both Clubs then proceeded to visit the noble residence and gardens of Stoke Edith, which had been kindly thrown open to their inspection by the directions of the Right Hon. the Lady Emily Foley, communicated through her Ladyship's agent, Mr. C. A. Mason. Mr. Robertson, the head of her Ladyship's horticultural establishment, received the visitors, and conducted them through the gardens. The new Italian garden, now in course of laying out at the southern front of the house, excited some attention.

THE DORMINGTON LANDSLIP.

The naturalists then proceeded to visit that singular and most instructive spot, the landslip near Dormington, a conspicuous object from the Ledbury and Hereford road, but one which has probably been looked upon by most tourists as merely what it seems to be—a large quarry. Had they visited the spot, they would have come away with very different feelings, however little they might have known of the geology of the district. The impression made by a first view upon an intelligent spectator is not to be soon forgotten. A whole field of several acres in extent, which has precipitated itself down a steep descent, and been broken to fragments in the fall—fragments of every conceivable form, and of all sizes from that of a footstool up to that of a good sized house; some of them bare and weather-beaten masses of crumbling rock, others green islands of grass, wild flowers, and trees—is a sight confessedly not to be seen often, nor to be soon forgotten when seen. To the geologist, the spot is one of the deepest interest.

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This huge mass of ruin is to him an evidence of the power of that mighty agent, water, since he correctly traces the slip to the percolation of water which had fallen upon the field, and had made its way out through the loosely compacted mass of fossils which formed the substratum. The rock is the Upper beds of the Aymestrey Limestone, which are composed almost wholly of madrepores, corals, shells of the Pentamerus and the Atrypa—extinct bivalves allied to the familiar cockle of the present day—besides the curious Leptæna, with its ridged margin and its beautifully striated surface, and the flat shells allied to the pilgrim's "escallop," so familiar to ballad and romance, but which can only boast the hard names of Orthis, Avicula, Rhynconella, and such like. This singular chaos in miniature would doubtless long ago have disappeared by the simple process of the conversion of the rock into lime, but for the fact that it is, commercially speaking, too impure to repay the cost of burning it. Like many other things in this world, its worthlessness protects it; and thus an instructive scene is preserved for the student of nature.

The slip, as our local readers know, occurred nearly thirty years ago,* in the evening. An eye witness assured us that he was sitting quietly in his cottage, which is not far off, when he heard a loud noise like distant firing. He ran out, and saw the vast mass of some thousand tons in weight, rolling down into the deep valley below. The surface of the hill all around seemed to quake with the effort, and presented to his mind the idea of one of the terrible earthquakes of which, happily, in this country, we only know that which we learn from books.

The fragments are slowly crumbling down under the influence of the seasons; vegetation is silently clothing them with an ever-extending robe of verdure, and in process of time all these glacier-like ruins will be hidden from sight; but, for long years to come the Dormington Landslip will be a scene well worth the visit of the lover of nature, while it is a noble class-room for the student of geology.

In passing from this spot, the botanists of the party noticed the abundance of the Greater Knap-weed, Centaurea Scabiosa, a noble plant, especially when covered with its large purple-rayed heads of flowers, while the delicate White Meadow Saxifrage, Saxifraga granulata, a characteristic plant of the district, was also noticed as abundant.

From the Landslip the party proceeded to the British Camp on the summit of the range of hills, which has, for some unknown reason, been styled the camp of the Saxon St. Ethelbert. Here some of the party bestowed a passing glance upon the remains of the earth works, which are most perfect on the western side—the opposite to that by which they had entered the camp—while others looked with equal delight and interest upon the unsurpassed view over the broad champaign of Herefordshire, in which the beautiful Wye revealed itself here and there, glittering like silver even amid the somewhat clouded atmosphere. The tower of Hereford Cathedral and the Church spires were lighted up for a minute or two

* Its occurrence is recorded in the *Hereford Journal* of March 20th, 1844. The date of the landslip is not given.—*Editor.*

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by a faint beam of sunlight, but the lofty ranges of "the stormy hills of Wales" loomed out but dimly in the background.

To the geologist the scene was interesting, as bringing together in one view, classic Siluria, with the Syenite of Malvern, the Basalt of Titterstone, the Old Red Sandstone of Radnorshire and Breconshire, the Cornstone ridges of Herefordshire, the Mountain Limestone wall of Dean Forest, with the Liassic and Oolitic formations of the Severn Vale and the Cotteswolds.

On this spot, under the shadow of the lofty Scotch firs which crown the summit where, may be, Caractacus once marshalled his brave followers, the peaceful students of nature assembled, with the expectation of hearing a lecture on the geology of the district, from the eloquent President of the Malvern Club, the Rev. W. S. Symonds, Rector of Pendock. The President, however, was compelled to disappoint expectation by the announcement that, as Mr. Symonds had been unexpectedly prevented from being present, and as he (the President) had been unable to prevail on any of the geologists present to address the company, that part of the plan must necessarily be given up. He, however, had another announcement of a more agreeable character to make. They were met on that spot by the kind permission of Mr. Thomas Evans, of Sufton Court, who had, with his characteristic hospitality, on learning that the meeting was fixed to be held in his neighbourhood, thrown open his house to the members from a distance. He, however, had felt that in the present state of Mr. Evans' health, it would not be at all proper for them to avail themselves of his very kind invitation; and he (the President) had intimated that feeling to Mr. Evans, while thanking him on the part of the members, for his kindness. Mr. Evans, however, not satisfied with the mere invitation, had given a fresh proof of his kindness by sending up the materials for a handsome luncheon to that spot. (Applause).

As even geologists and botanists must eat and drink, like other people, and as the out-door pursuit of science is particularly favourable to the cultivation of a good appetite, the latter part of the President's short address was received with hearty applause. Their minds had been deprived of a banquet, but it was not considered at all necessary to fulfil the poet's resolve by "letting the body pine"; and so the luncheon was attacked with spirit, and was relished all the better for being partaken of on the breezy hill-top, under a sky which wore at the time a somewhat threatening aspect.

After luncheon the party proceeded through the wood to the well-known "Hatton's-rocks"*—a striking spot at the eastern ridge of the Camp, where enormous masses of rock hang impending over the deep woody valley beneath. Here the famous Woolhope "valley of elevation," by the exploration of which Sir Roderick Murchison worked out his great Silurian System, is visible at a glance. The deep concentric valleys represent the denuded shales, while the separating ridges are composed of the harder rocks. In the centre the Caradoc Sandstone rises as a vast dome, though the lowest in the series of the Silurian

* At the period of republication (1907) these rocks are very generally known as Adam's Rocks. The late Judge W. H. Cooke advocated Atoms Rocks.—*Editor.*

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rocks here exposed; the Woolhope Limestone lying immediately against the base of the dome. The cliffs of the limestone hills are dotted here and there with quarries and lime kilns, the refuse heaps around which are capital ground for the fossil- hunter.

It was decided that the geologists should make their way to Dormington lime-kilns, and accordingly the whole party scrambled down the precipitous descent, over the heaps of débris, and made their way through the wood. On the way the botanists of the party gathered true-lover's knot, *Paris quadrifolia*, Wall Hawkweed, *Hieracium murorum*, Shining Crane's-bill, *Geranium lucidum*, and Hellebore, *Helleborus fœtidus* and *H. viridis*. The presence of wild Garlic, *Allium ursinum*, in large quantities was unpleasantly evident to the olfactory senses of the party.

In Dormington wood and around the lime-kilns, the Small-flowered Crowfoot, *Ranunculus parviflorus*, the Columbine, *Aquilegia vulgaris*, very fine in both plant and flowers; the Yellow-wort, *Chlora perfoliata*, the Hemlock Storksbill, *Erodium cicutarium*, remarkable for the contrast between the long style and small purple flowers; the Smallest Cudweed, *Filago minima*, the Mealy Guelder-rose, *Viburnum Lantana*, and other more common plants were found abundantly.

At this point several parties of botanists started for the exploration of the neighbouring parts of Haugh Wood, Checkley valley, the course of the Pentaloe brook, &c., One of these parties found the Lily of the Valley, *Convallaria majalis*, in all its beauty and fragrance, rather plentiful in Checkley valley.

About half-past four p.m., the different detachments of the party reassembled around the dinner table at the Foley Arms Inn, Tarrington, where an excellent dinner was served in "Sir Roderick's room," so named from its having been often occupied by that eminent geologist when working out his Silurian researches. The Chair was occupied by Mr. C. Lingen, the President of the Woolhope Club; and the Vice-chair by the Rev. W. S. Symonds, the President of the Malvern Club; and the party included as visitors the Rev. F. Merewether, Woolhope; Rev. T. H. Bird, Yarkhill; Rev. G. Smith, Tarrington; Messrs. R. Hereford, C. T. Bodenham, A. Y. Spearman, Jas. Davies, J. De Blaquiers, &c., &c. Among the members of the Malvern Club present we noticed Rev. W. Haywood, Rev. A. J. Douglas, Lieut. W. C. B. S. Constable, Mr. Edwin Lees (the author of "Pictures from Nature" and other excellent works on Natural History), and Mr. Walter Burrow, Hon. Secretary. Among the members of the Woolhope Club were Mr. Lingwood, Rev. J. F. Crouch, Mr. E. Y. Steele, Mr. Salwey, Dr. Bull, Mr. Cam, Mr. Lightbody, Mr. Cocking, Mr. Curley, C.E., Rev. T. Hutchinson, Rev. J. Miller, Mr. Banks, Mr. Edmunds, Mr. A. Purchas, Mr. A. Thompson, Dr. Rowan, Mr. Blashill, &c. Grace was said by the Rev. G. Smith.

After the removal of the cloth the President read a kind letter which he had received from Sir Roderick Murchison, expressing his regret that the pressure of his other scientific engagements, especially in preparing for the Annual Meeting of the Royal Geographical Society, of which Sir Roderick is President, rendered

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it impossible for him to be present, but expressing his earnest wishes for the prosperity of the Club. The toast of "the Queen" having been drunk, the health of Sir Roderick Murchison followed, and the remainder of the evening was spent very pleasantly in speeches and discussions on points of natural science.

Mr. Symonds expressed his regret that an attack of sore throat had prevented him from being present at the out-door explorations of the Club that day, and he regretted still more that a similar cause had prevented that eminent naturalist, Sir Wm. Jardine, from being present among them that day. He then proceeded to sketch with admirable clearness the recent important discoveries in Geology, such as the discovery of animal remains in the Longmynd rocks, so long supposed to be azoic, or destitute of life; the discovery of the remains of fish by Dr. Bevan, of Beaufort, in the South Wales Coal-beds, and of a highly organised flowering plant in the Newcastle coal shale by an eminent Northumbrian geologist; the important new light thrown on the tilestones by the researches of Mr. Banks; the greatly enlarged range over which it now seems trilobitic forms of life extended, &c. After paying a high compliment to the geologist named, and to Mr. Roberts of Kidderminster, Mr. Symonds eloquently enforced the lesson of caution in the formation of theories, as being particularly suitable to the students of a science yet so young as geology.

Mr. Lees, of Worcester, in a clever and humourous address, alluded to various points of Botanical history, calling attention to the appearance of fresh plants in various localities, which he attributed to their seeds being carried by the wind. He exhibited a specimen of a new form of oak-gall, which he had seen in some places in Worcestershire, and enquired if it had been observed in Herefordshire. He also noticed the new Canadian Water-weed, the *Anacharis alsinastrum*, which has invaded the rivers of Worcestershire and other countries, and would be glad to hear if any botanist had yet discovered it in the Herefordshire waters.

Mr. Lingwood remarked that the gall alluded to was exceedingly plentiful in the neighbourhood of Lyston and the Mynde.

Dr. Bull understood that the Anacharis had been very lately found in the canal, about two miles from Hereford.

Mr. Lees made reference at some length, and with much humour, to the statement of his friend, Mr. Edmunds (reported in the Woolhope Club's Transactions), as to the appearance of a number of plants on the railway embankments near Hereford, which Mr. Edmunds supposed to be reproduced from long-buried seeds. He (Mr. Lees) considered on the contrary that the seeds had been transported thither by the wind, and he stated some facts in corroboration of his view. He looked upon this as a case analogous to the monumental pillars of Oolite stone which he once saw in a churchyard situated on the New Red Sandstone: they had undoubtedly been brought thither.

Mr. Edmunds replied, jocularly regretting his inability to subscribe to the theory of his friend, whose argument he declared to be very good—too good to be accepted. (A laugh). In fact it proved too much. If the mere presence of

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these fresh plants must be held to be proof that the seeds had been carried thither by the wind, then the presence of his friend's Oolitic pillars might be taken as due to the same cause. (Laughter). Badinage apart, the facts would not bear the explanation. The wind did not bring those seeds to the neighbouring ground, nor has it this year brought such seeds to the ground where the plants grew last year. Before those plants appeared on the spoil-banks, among the sand and earth which had been dug up from the excavations, no such plants were to be found within some miles of the spot. On a view of all the facts, he felt confident that the assembled Clubs would, notwithstanding his friend's talent and humour, return a verdict that his indictment was "not proven." (Laughter and applause)

The President then called the attention of the meeting to a very singular specimen of a hybridised plant, which had been sent to him by Mr. Godsall, Nurseryman, of Hereford. The stock of the tree was a common yellow laburnum, but having been budded with a purple laburnum, it for some years produced only purple flowers. Now, however, as in the branch before them, the tree produced yellow flowers on one side and purple on the other; and, which was much more remarkable, a cytisus, with purple flowers. The occurrence of the yellow flowers was easy to be accounted for by the known law of physiology, that the offspring has a tendency to return to the original type; the stock of the tree being the yellow laburnum, it was in this case making an effort to return to its normal state; but the question remained, how came the cytisus there? Probably the tree had been grafted with it before, but the singularity of its remaining dormant, and then suddenly reappearing after a long interval, was worthy of notice.

Mr. Lingen then proceeded to deliver a short lecture, illustrated by coloured diagrams, upon the formation of the seed and the bud, pointing out with great clearness, and in an easy, lively style, the distinctions between the seeds of the monocotyledonous and dicotyledonous plants, and explaining the distinction between both those seeds and the spores of the fern. He remarked that the great object of the plant was to produce a seed, and that the seed was designed to reproduce the species, while the bud was designed to reproduce the individual plant. After explaining the formation of the bud, he concluded amid applause, by promising to resume the subject at a future meeting.

The Rev. Mr. Hutchinson exhibited specimens of *Botrychium lunaria*, *Polygonatum multiflorum*, and *Pyrola rotundiflora*, all gathered in the neighbourhood of Kimbolton.

In the course of the evening it was stated that Mr. Edmunds had, within the last few days, discovered *Ranunculus caenosus*, a plant supposed to be new to the district; and had also found *Chrysosplenium alternifolium* and *Geranium pyrenaicum* in a fresh locality, all in the vicinity of Hereford.

About 8 p.m. the party broke up, having spent a most delightful day.

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, JULY, 21ST, 1857.

LUDLOW.

The Second Field Meeting was held on Tuesday, July 21st, at Ludlow. In their choice of the day the members were singularly unfortunate, Tuesday being being the first wet day we have had for several weeks past, and being followed, as well as preceded, by fine bright weather. The rain began soon after the Hereford members departed by the 9-45 train for Ludlow, and continued with scarcely an interval, until evening. Despite this drawback, however, there was a pretty good muster—the party at dinner numbering 22—and the scientific explorations of the day were carried on with zeal, although the range of country examined was necessarily much restricted by the weather.

Among the members present were: Mr. C. Lingen, President of the Club; Mr. Suter, Hon. Sec.; Mr. Lingwood, Mr. T. H. Lee Warner, Rev. J. Miller, Messrs. Salwey, Lightbody, Cocking, Cam, Flavell Edmunds, Ballard, Curley, G. Smith, A. Thompson, and Rev. J. D. La Touche, of Stokesay. The list of guests present included Mr. C. T. Bodenham, Rotherwas; Rev. Mr. Green, Holme Lacy; Mr. W. Gilkes, Mayor of Leominster; Mr.T. T. Davies, Hereford, &c.

On arriving at Ludlow, the members departed, in two crowded omnibuses, for Forge Bridge, the nearest point of the Silurian district of Downton, not more remarkable for the exquisite beauty of scenery than for the geologic interest attaching to the chief formation there developed. The fine-grained, compact, Downton Sandstone, so valuable for building purposes, is particularly interesting to a geologist, as the uppermost member of the Silurian system, and therefore the next formation to the massive Old Red.

At the point of junction between the Leintwardine road and the road to Downton Castle, the party alighted from the conveyances, which were sent on to the furthermost point at which the Downton gorge approaches the road, there to await them at the close of the pedestrian part of the journey.

On their alighting, the members were joined by Col. Colvin and Mr. Colvin, junr., who kindly acted as their guides in the exploration of this very beautiful tract of country. Col. Colvin on this occasion acted as the representative of Mr. J. H. Tarratt, who thus conveyed an invitation to the members to lunch at the Castle, and also kindly threw open the Park for their explorations.

The members proceeded first to the quarry on the roadside near the Bridge, where the geologists of the party spent half an hour very satisfactorily, bagging

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a number of fossils. The party then crossed the glen, after admiring the bold arch of the very beautiful bridge which at this spot spans the Teme, and visited several newly opened sections of rock on the south side of the river. They subsequently re-crossed the river, and made their way along its north bank to Downton Castle.

At this finely situated mansion, a handsomely provided luncheon awaited them, at which Col. Colvin presided in the unavoidable absence of Mr. Tarratt. In the course of the luncheon it was unanimously agreed that the Hon. Secretary of the Club, Mr. J. A. F. Suter, be requested to convey the thanks of the members to Mr. Tarratt, for his kind consideration. The only toast drunk was proposed by Mr. Edmunds, who remarked that he had been requested by his fellow members around him to express the sentiments which they all felt towards their hospitable entertainer. Not only had he thrown open to their view the exceedingly beautiful park, upon the scenery of which they had gazed with such gratification, but he had also invited them to examine the still more beautiful scenery of the upper part of the gorge, and he had with kind thoughtfulness entertained them very handsomely also. He begged to express their grateful sense of the hospitality of Mr. Tarratt by drinking the health of that gentleman. (Applause).

This toast having been cordially drunk, the party rose from table, and having spent a few moments in admiring the beautiful prospect visible from the south front of the castle, seen as it was through the thin veil of the constantly falling rain, made their way towards the "Walks," in the upper gorge of the river. At and near to the bridge they examined various outcrops of the Old Red and of the Downton Sandstone, and then entered the gorge, noticing and admiring the "dim religious light" of the grotto, the musical murmurings of the river, and the ever-changing beauty of the winding course. It was remarked by one member that the scenery bore so strong a resemblance to that of a part of the Scottish Lake district that the gorge might fitly be called a miniature of the Trossachs.

Having made their way up the gorge as far as the cottage of the Leintwardine fishery watchman, who is a careful collector of fossils, many of the members examined his collection of *Protasters*, the star-fishes of primæval waters, and other curious fossils.

At Bow Bridge the fine sweep of the valley and the lofty range of perpendicular cliffs excited their admiration. Here, of course, the hammers of the geologists speedily awoke the echoes, not wholly unused to such summonses it must be admitted.

On the road above this lofty cliff the vehicles awaited the party; and here they departed from their kind guides, Col. Colvin and Mr. Colvin, jun., who returned to Leintwardine, while the rest of the party were rapidly driven towards Ludlow, where the important business of dining had to be transacted.

The Botanists of the party had of course only glanced at the treasures of the district through which they had passed. They had, however, secured specimens of the beautiful *Polypodium dryopteris* and *Aspidium filex foem.*, *Cystopteris fra-*

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gilis, Ceterach officinarum, with many other more common ferns. Among the phanerogamous spoils of the day were *Trifolium arvense, Campanula trachelium, Fedia carinata*, &c.

The members and visitors sat down to an excellent dinner at the Feathers Hotel, at 5 p.m., the President occupying the Chair, and the Vice-chair being filled by the Hon. Secretary. After the removal of the cloth the President gave "the Queen," which was the only toast drunk.

The Rev. J. D. La Touche, of Stokesay, was unanimously elected a member.

Mr. Ballard laid upon the table some sections of an oak tree and a poplar as illustrations of the different results of what he distinguished as natural and artificial pruning. In the latter case, which was that of an oak, the decayed stump of the pruned limb had remained, the tree having formed a complete box all around it; and the wood, which seemed from the outside perfectly firm, revealed, when cut with the saw, a large cavity. He remarked that long experience convinced him that artificial pruning was altogether injurious; the new wood seldom unites with the old, and where it does a knot is formed. In either case the value of the timber is lessened. In the case of natural pruning nature had completely healed up the wound, without the solidity of the wood being at all affected. The oak appeared to have been pruned about 30 years ago, judging from the concentric rings.

A brief conversation ensued, in which Mr. Lingwood seemed to express a conviction that pruning of trees is sometimes necessary; and the President remarked upon the difference between the true bud, the design of which is to produce a leaf or a flower, and the merely adventitious buds, which are sometimes produced when the top of a poplar is cut off. He laid on the table an instance of the kind in a lily, which had not only produced flowers and seeds, but had also produced adventitious buds.

Mr. Cocking, at the request of the President, gave a brief sketch of the discovery of the *Protaster*, or star-fish, in the rocks which they had been that day visiting. He also exhibited specimens of *P. Miltoni*, and several other species.

The President subsequently occupied a short time not less usefully than pleasantly in a brief but lucid lecture on the formation of the flower, in continuation of his remarks at Tarrington on the bud. He illustrated his observations by a number of coloured diagrams of the different parts of the flower, concluding amid applause.

Shortly before 7 p.m., the party broke up, and the Hereford party reached this city by train at 8·20 p.m.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, TUESDAY, AUGUST 25TH, 1857.

SHUCKNALL—HAGLEY PARK—BARTESTREE.

The last Field Meeting for the present year was held on Tuesday, August 25th. The district selected for the explorations of the members being the huge upcast of Silurian rocks at Shucknall, the Old Red of the vale of Weston Beggard, the trap dyke or protruded mass of volcanic matter in Hagley Park, near Bartestree chapel; and the famous dome of Hagley. The route thus included the opposite side of the valley to that chosen for the first Field Meeting of the year, which was held at Tarrington in June last.

On this occasion, owing to the contiguity of the scene of investigation to the city, the usual meeting at breakfast was dispensed with, and about 10 a.m. a party of the members met at the Green Dragon Hotel, from whence they departed soon afterwards in a brake. The route lay by Westhide, which is situated on the north slope of Shucknall, and on reaching the ancient Church of that parish the party were received by the Rev. Mr. Bulmer, the Curate, who kindly threw open the little but very interesting old Church for the inspection of the members.

As most of the party had eyes for the beauties of Archæology no less than for those of the natural sciences, a half hour was spent very pleasantly in examining the curious recumbent figures of the 14th century, one of which appears to represent a lawyer; the interesting incised stone of the reign of Henry VII., with its black letter inscription; the ancient carved brackets which supported the rood-screen; and the windows, which belong respectively to the Early English, Early Decorated, Flowing Decorated, and Early Perpendicular periods.

From the Church Mr. Bulmer led the party to his house, in the grounds of which an elm tree of prodigious size was made the occasion of a short but instructive address by the President of the Club, Mr. C. Lingen.

The President pointed out the remarkable fact that there was something like a stream of new wood, which, like an eruption from a volcano, had broken out far up the trunk of the tree, and had flowed downward to the ground, filling up a great portion of the space left by the decay of the stem of the tree. The centre wood was altogether gone, yet the vital power of the tree seemed to have made extraordinary efforts to repair the loss. At various points fresh leaves were thrown out from the bark, contrary to the natural arrangement, which only produces leaves upon or about branches. He pointed out the fact that it was only plants of the comparatively low natural order to which the elm, the nettle, and one or two other plants belong, which possessed this astonishing amount of

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vital energy. The oak could neither produce this stream of fresh wood, nor throw out these adventitious leaves at places so far removed from the growing points of the tree.

On the conclusion of the President's remarks, the Rev. Mr. Bulmer invited the members into his house, and there hospitably entertained them with refreshments. The intense heat of the day rendered this little episode by no means the least agreeable part of the day's proceedings.

About 1 p.m. the party left Westhide, Mr. Bulmer guiding them, visited several quarries, and penetrated through the wood to the summit of the hill. Here for a while they regaled their eyes with the glorious landscape, not less powerful in its suggestiveness to the geologist than admirable for its picturesque beauty. The view ranged from the Syenitic peaks of Malvern and the Basalt of Titterstone to the Upper Ludlow hills of northern Herefordshire, the Cornstone ridges of Dinmore and Burghope and Credenhill, and the Old Red of the broad campaign and of the long dark range of the Black Mountains—while the lofty Pen-y-fal, the dimly seen Blorenge, and the peaked Scyrrid suggested the immense Carboniferous district of South Wales which lay behind them; and the eye returned from the vast range along the Cornstone ridge which runs up the county from the Graig and Garway to Dinedor and the Wye.

Having crossed the summit the party made its way to the immense section on the south side, which is conspicuous from a great distance, like a scar upon a giant's forehead. Here they spent some time pleasantly with their hammers, but no new fossils were disinterred—if that word may be properly applied to the extrication of fossils from a bed of rock.

The next point made for was the Trap dyke at Bartestree. Here the party were received by Mr. J. Radcliffe, of Hagley House, along with whom they descended into this very striking chasm—solemn in its stillness, the lofty walls of rock at the sides, and the thick coppice at the foot, shutting out all the outer world save the soft blue of the sky overhead, or the masses of fleecy clouds which sailed slowly across it. Here the conical jet of Toadstone—the least compacted form of lava—was traced through the sandstone rock, which still bears unmistakeable marks of the fiery heat of the matter so forced through it. It is evident that the molten matter cooled as it reached the surface, and did not overflow. It was noticed that the Old Red beds lie almost horizontal on each side of this miniature volcano, which fact was explained by Mr. T. T. Davies of this city as suggesting the conclusion that the eruptive force came into action suddenly; had the process been a slow one it must have tilted up the beds, but being sharp and sudden it broke through them.

From the Trap-dyke the party proceeded to Hagley House on their way to the dome in the Park. At the house Mr. Radcliffe very hospitably set a luncheon before the party. After a short stay they visited the dome, an upheaved mass of Old Red, Downton Sandstone, and Upper Ludlow, the scene of the discovery of the celebrated fish-bed made by the late lamented Hon. Sec. of the Club, Mr. M. J. Scobie, F.G.S. The excavation having been partly filled up however, the members were unable to trace the fish-bed.

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At the Park gates the party took leave of Mr. Radcliffe and resumed their conveyances to Hereford, reaching the Mitre Hotel, the scene selected for the very necessary operation of dining, shortly before 5 p.m. Here they partook of an excellent dinner under the Presidency of Mr. C. Lingen, President of the Club, Mr. J. A. Suter, Hon. Secretary, occupying the Vice-chair. Grace before and after dinner was said by the Rev. Mr. Bulmer. The only toast drunk was the health of "the Queen and the Prince Consort," whose patronage of science was neatly referred to by the Chairman. The meeting then proceeded to transact the business of the Club.

The list of ordinary members was stated to be full. The subject of extending the number fixed by the rule was opened, but postponed to the Annual Meeting.

The Rev. W. S. Symonds, Rector of Pendock, and author of "Old Stones," "Stones of the Valley," &c., was elected an honorary member.

The Hon. Secretary mentioned the discovery of a crustacean in the Cornstone near Rowlstone, in this county, by a gentleman who had communicated it to Mr. Symonds. The specimen had been sent to the Museum of Economic Geology, and its discovery was considered by the most eminent geologists of the day as one of the very greatest importance. The name was not yet fixed. He observed that Mr. Symonds would have been present at that meeting but for the fact that the opening meeting of the British Association, at which he was anxious to be present, was fixed for the following morning at Dublin, thus rendering it impossible to be present at both.

The subject of the new Canadian Water-weed was reported upon by Dr. Bull, who said that since the last Meeting of the Club the *Anacharis* had extended itself through a great part of the Hereford Canal, and is now abundant in the basin at the Hereford end. He also stated that Mr. Edmunds had found the *Anacharis*, not only in the Canal, but also in the bye-pools of the Lugg meadows, a fact which was more difficult to account for than its presence in the Canal. He observed that the notion of its presence in the Wye had got abroad among some people who could not be supposed to be very accurate in their botanical knowledge. He had examined one place where a boatman had told him the "new water weed" was growing, but he saw nothing there but *Potamogeton* and *Myriophyllum*, and he did not think that a rapid stream like the Wye was a place where the *Anacharis* was at all likely to gain a footing. That plant loves shallow and slow-moving or stagnant water best; a rapid stream with a large body of water does not suit it. He remarked upon the short period which had elapsed since the plant was first noticed, and upon the mysterious manner in which it had since spread over the country. He knew of its having been found at Northampton in 1836, and Dr. Hooker recorded its first discovery in Scotland in 1841, and since that time, by some unknown means. it had made its way into rivers, canals, and pools in all parts of England. It would seem to propagate itself by fragments torn from it taking root wherever the water dropped them, for all the plants which had been found in flower in this country are stated to have been male plants. He begged to suggest that, as the time of flowering is just now, some member of the Club might test the correctness of the statement on this point.

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A brief conversation ensued, in which the President, Mr. Edmunds, the Hon. Secretary, and other gentlemen took part, but it did not appear that any one of them had yet found the plant in flower.

The President then called upon Mr. Edmunds to address the meeting on the subject of buried seeds, some fresh facts in reference to which he understood that gentleman had to state.

Mr. Edmunds briefly recapitulated the leading points of the discussion which had been originated by his friend, Mr. Lees, the well-known naturalist of Worcester, at the meeting at Tarrington. They would remember that Mr. Lees took up a paper which he (the speaker) had read to a former meeting of the Club, the subject of which was the sudden appearance of certain species of plants fresh to the district on the railway embankments near Hereford, and their almost equally sudden disappearance. He had attributed their appearance to buried seeds having been, by the disturbance of the soil from a considerable depth, brought again within the range of atmospheric influences, which had caused their vitality to revive. To this view his friend Lees had demurred, holding that the seeds must have been transported by the wind, and he instanced cases of certain plants always making their appearance on spots which, after having been cultivated, were suffered to become waste. He (Mr. Edmunds) held that argument to be unsound, for the reasons that the plants were confined to a small surface, that they did not appear before the spoil bank was made, and that they have now again disappeared, all which facts are inconsistent with the agency of the wind in the case, more especially since the plants alluded to were of the heavy-seeded orders, with one exception. This exception belongs to the order Compositæ, the seeds in which are furnished with a pappus, or parachute-shaped crown of fibres, evidently designed to aid their dispersion by the wind.

He wished now only to add that, since the discussion, a gentleman who was then present had called upon him and told him of a fact strikingly corroborative of his views. A piece of old pasture land in Warwickshire had been broken up, a house built and a garden laid out oupn it. To the great surprise of the occupants, plants of the *Rubus idaeus*, or common raspberry, sprang up plentifully around the house, and they have since supplied the family with all of that description of fruit which they had required. Upon the theory that there had once been a wood there; that the seeds had been buried under the vegetable soil formed by decayed leaves, &c.; that, on the cutting down of the wood, the growth of the sward had sealed up the seeds; but that they germinated as soon as the removal of the turf and the disturbance of the soil brought them again within reach of atmospheric influence, the case was clear enough; but he thought it quite inexplicable on what he would call the ventose theory.

He remembered having read of another case in which a gentleman, while passing a long un-worked coal-pit, and observing the buckets full of earth, &c., drawn up, had filled his botanical box with it, taken it home, covered it with a glass, and watered it with condensed steam, thus guarding against any arrival of seeds by either wind or water. The result was that the experimenter got some

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ten or twelve plants from this covered soil, all of which, save one (the universal *Trifolium repens*, or Dutch clover) were fresh to the district.

Dr. Steele of Abergavenny (who had been unable to stay to the dinner owing to a prior engagement) had told him of a case in which the bringing of soil to the surface had issued in the appearance of a species of *Veronica* which had not been previously seen anywhere in the neighbourhood.

He (Mr. Edmunds) had himself seen *Linum usitatissimum*, or common flax, growing between the pavement stones of a yard in Hereford, although upon enquiry he could not find that, for 20 years at least, the plant had ever been grown there. Many years ago, however, some earth had been brought thither from a distance, and it might be that the seeds had been then brought and buried, but had not germinated until the decay of the mortar suffered atmospheric influences to reach them.

He also alluded to the fact stated by their late respected President, the Rev. James Crouch, as to the sudden appearance of *Hyoscyamus niger*, common Henbane, after the opening of a deep drain in his own lawn.

All these facts were quite clear upon the hypothesis that the seeds were buried, but were unintelligible to the wind theory. (Applause).

An animated conversation ensued, in which the President, the Hon. Secretary Dr. Gilliland, Dr. Bull, Rev. Mr. Bulmer, Mr. T. T. Davies, Mr. Akerman, and other gentlemen took part.

The President thought the facts stated, with the exception of the flax case, very strong proofs in support of Mr. Edmnnds' theory. The flax seed might have been dropped from the cage of some canary kept in the adjoining house.

Dr. Bull took a similar view of the facts. He thought that they quite demolished Mr. Lees' theory. It was remarkable that these appearances of fresh plants were all under circumstances which agreed with Mr. Edmunds' explanation.

Mr. Akerman had thought that the suspension of vitality in seeds was admitted on all hands. He alluded to the case of the mummy wheat. Dr. Bull remarked that some eminent botanists had expressed their entire disbelief in the story of the wheat having been found in the mummies.

The Hon. Secretary thought there was not much dependence to be placed on the statements of the Arabs; they would find plenty of mummy wheat when they discovered that there was a demand for it.

Dr. Gilliland had read some very circumstantial accounts of the finding of the mummy wheat, its committal to the ground, &c.

Dr. Bull agreed that there was little dependence to be placed upon either the Arabs or upon the tradesmen's announcements that they had mummy wheat for sale, but he could not wholly reject the accounts which he had read.

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Mr. Davies inquired whether, in the cases referred to by Mr. Edmunds, the seeds might not have been washed into crevices of the ground by rains, and there buried ?

Mr. Edmunds thought it very probable.

The Hon. Secretary observed that where there was water there was air also, so that the vitality of the seeds might be thus exhausted while buried.

Dr. Gilliland remarked that light was also necessary before plants could grow.

After some further remarks the company separated.

During the day the members present were: Mr. C. Lingen, President; Mr. Suter, Hon. Secretary; Rev. J. H. Barker, Mr. DeBoinville, Dr. Bull, Mr. Cam, Mr. Edmunds, Dr. Gilliland, Dr. Steele, Mr. Thompson. The visitors present were: Mr. Ratcliffe, Rev. — Bulmer, Mr. T. T. Davies, Mr. James Davies, Mr. Akerman, Mr. Cunningham.

The botanists of the party made no important "finds" in the course of the day, but specimens of a curious *plantago*, supposed to be a dwarf state of *P. media*; of a *Campanula*, apparently midway between *C. rapunculoides* and *C. Trachelium*; of the beautiful *C. patula*: and of a dwarf state of *Lepidium Smithii*, rewarded the zeal of some of the party. The dwarfed state of the herbage generally on the north side of Shucknall Hill was observed as being somewhat more marked than usual.

BURIED SEEDS.

To the Editor of the "Hereford Times."

SIR,—In the report of the proceedings of the Woolhope Naturalists' Field Club, which appeared in your last number, I observed a second notice of what has not been inaptly called the ventose theory, to account for the general distribution of plants, or that which is the same thing, being a consequence thereof, the appearance upon newly-excavated soils of plants specifically, and, it may be, also generically, distinct from those to be found in the surrounding district. It was a matter of considerable surprise to me to find that a botanist of reputation, like Mr. E. Lees of Worcester, should be a supporter of so airy an hypothesis, which, if duly examined, would be found scarcely more rational than that hypothesis designated funicular, by which a section of the "schoolmen," before the nature and properties of the air were ascertained, or the science of æro-dynamics even dreamed of, sought to account for the ascent of light bodies through the ærial medium, deeming it to be effected through the agency of invisible threads. That the seeds of many plants belonging to the Compositæ are widely distributed by the agency of the wind is indisputable; and that the pappose appendages with which they are furnished is a provision of nature for such purpose, appears highly probable; but the partial distribution of the more ponderous seeds through

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such means could not (one would think) be reasonably considered as any other than what is properly called accidental. Certainly the appearance, in numberless instances, on virgin soils, of plants strange, with respect to the botanical character of the circumjacent lands, in some cases, perhaps, many miles in extent, could not be explained upon such theory. During the last 25 years provincial botanists have had extensive fields of observation opened to them by the formation of railways, the embankments of which afford ample scope for the investigation of the question at issue; and need it be said that the Anemonians would often be grieviously puzzled to maintain the credit of their agent as a general carrier. The earth of which railway empankments are formed has often been conveyed from a distance in some instances, perhaps, of 10 or 20 miles, and excavated from a considerable depth. In the course of a few months after its completion it is found to possess a Flora peculiar to it, from which posies might be culled, more dainty, perhaps, than any to be found in the "sweet garden of nature" thereabout. Which would be the more rational mode of accounting for such phenomenon?—that the seeds were brought thither by a special conveyance of Dan Ventus, the carrier, or that long-buried germs, newly brought within the sphere of the combined influence of air and light, being vitalised, "burst their cerements," and were expanded into beauty by the plastic hand of nature?

It is worthy of remark that the Flora of an embankment does not long continue peculiar, a variety of causes operating in the distribution of the seeds through the adjacent districts, where each, according to its nature, elects a soil congenial to it, and becomes a settler; and it is an indisputable fact that many districts traversed by a railway embankment have had their Floras enriched by the addition of plants which were not to be found there before the formation of the line. As to the power of seeds to preserve their vitality for an indefinite period, when placed beyond the agency of air and light, I see not how scientific men can regard it as indisputable; certainly geologists, of all others, do so with the least grace, and those who would

"Shame the doctrine of the Sadducee"

are surely not disagreed upon the matter (?). The study of entomology would reveal to each and all of them more marvellous facts.

A remark upon this question, made by a member of the Woolhope Club, as given in your report, appeared to me extremely unworthy of one in his position. It was something equivalent to stating that the supply of mummy wheat would be always equal to the demand—as if anybody could be found, at least among those who are speculative enough to seek a few grains of the said wheat for the experiment, so weak-minded to believe it to be procurable at Memphis or Cairo at Mark-lane prices. Certainly we are among the most gullible people of the northern hemisphere—even science has its dupes; but if there is any master tiller of the ground of the mental calibre referred to, for aught of agricultural science the world could expect from him, he might at once be steeped in mummy and deposited in the great Pyramid.

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Doubtless many people have purchased modern Egyptian for genuine mummy wheat, and there can be no question that the Egyptian trader, if he were encouraged by European credulity, would find an inexhaustible store of it in Pharaoh's granary, but the truth is that, with all our folly, we do not give scope to fraud in that direction. We will go any length you like in the matter of antiquities, as those travelled sages can prove who have purchased at Memphis "petites idoles," &c., the spoils of the Pyramids, which had been manufactured at Birmingham for the gratification of those who ascend the Nile in pursuit of knowledge under difficulties. Believing that the vital principle of seeds may be preserved indefinitely, if protected from external influences, I see no reason to doubt the vitality of mummy wheat 3,000 years old, and that such grains have germinated and proved prolific within the last 10 years are well authenticated facts. It is, I presume, upon such facts that the theory as propounded by Mr. Flavell Edmunds is based, accounting for the appearance of plants in a newly-excavated soil in the neighbourhood of Hereford at a considerable distance from any other known habitat; and I take this occasion to say that the ungracious reception which was given to such theory by those who ought to have known better has led to the remarks herein made. It was Mr. E. who wisely applied the descriptive designation of ventose to the theory originated by his opponent, a theory characterised by ventosity, and certainly scarcely more tenable than the exploded one of spontaneous generation. Yes, ventose is the word—"thin air!" whose density will be increased by the light of science until it be ultimately annihilated as the baseless fabric of a dream.

BOTANICUS.

MEETING OF THE WOOLHOPE CLUB.

"BURIED SEEDS."

To the Editor of the "Hereford Times."

SIR,—Being from home, I have only just seen the report of the late meeting of the Woolhope Naturalists' Field Club in your paper, and as my name is brought forward in connection with the subject of "buried seeds," I think I may be permitted a word or two in explanation. Mr. Edmunds made a communication to the Woolhope Club on the appearance of certain plants on the railway embankments at Hereford, which he considered were the produce of seeds long buried in the ground. At the Tarrington meeting, which was a joint meeting of the Woolhope and Malvern Clubs, I alluded to the observations of my friend, Mr. Edmunds, but considered his idea of long-buried seeds was erroneous, and thought that upon newly turned-up soil the agency of the wind (which every botanical observer must admit does abundantly scatter seeds about) was sufficient to account for the appearance of the plants. I should not have mentioned the subject had Mr. Edmunds not been present, and he made an eloquent and forcible reply in defence of his theory. Now I think the matter

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should have rested there until we had both an opportunity of joining in friendly discussion again; but instead of that, proceedings are taken in my absence; the discussion, according to the Bridgnorth system, is all "on one side," and then a shout of victory is raised, that they "quite demolished Mr. Lee's theory." To proceed to actual demolition in my absence was rather too bad, and even had I been present, it would have been cruel to take all the wind out of me! When Mr. Flavell Edmunds and Dr. Bull, dissatisfied with the Tarrington skirmish, had resolved to give me a regular baiting, they should have considered that to impale me effectually on the horns of any prepared dilemma, it was necessary, and indeed only fair, to have me personally before the pack to show sport. As it is, they have only battered "the shell of Anaxarchus," and I shall be prepared to show as much vitality yet as any of their "buried seeds," though the winds may seem laid for the present.

In truth, I believe that I can dispose of most of the facts brought forward by Mr. Edmunds and his friends, without the necessity of taking the hypothesis (for there is no proof adduced) that the seeds that produced the plants in question had been buried for any enormous length of time. But I have no desire to be dogmatical, and beg to remark that I value every fact that can be brought forward on undoubted evidence, merely differing from my friends of the Woolhope Club on the explanation of the facts. I object to the term "ventose theory," given by Mr. Edmunds to my views, because I only bring forward the agency of the wind as a means of transport, in explanation of particular facts. The general aid given by the wind to disperse the seeds of plants is undeniable, as numerous walls, rocky escarpments, and waste places show every day. It is to be remarked that the seeds of plants in the cases mentioned are not really found, but only plants appear, presumed to have arisen from buried seeds, deposited a long time ago. Now, with our present knowledge, certainly being absent, when on fresh turned-up soil plants appear new to the vicinity (for that point seems to be relied on), which is the most reasonable supposition, that the wind has carried the seeds there from some place where the plants are now or were growing, or to presume an entombment of the seeds for centuries beneath the soil? No unknown plant has ever been thus brought to light, and as yet nothing is certainly known as to how long seeds could remain buried uninjured. Mr. Darwin has commenced experiments on the subject, but they are as yet incomplete; and reverting to first principles, let us, like good Mrs. Glasse, with her hare in the cookery book, first "catch" the seeds themselves buried in the soil, before presuming they are there. The mummy wheat tale, reiterated over and over again, has never yet been properly authenticated; and unless the experimentalist himself took earth at a measured distance underground, and from mines where no horse or hay had ever had access, strong suspicion attaches to common plants rising up from such a source. Cultivated plants, such as flax, rape, and agrarian weeds, are ever coming up in strange places where casually dropped, and soon again disappear; and I have myself seen dead plants of henbane, with abundance of capsules and seeds, blown about on a windy day in Autumn, while it is quite impossible to say where they grew originally. The seeds would doubtless be wafted into all sorts of queer places, and vegetate where they could. The case

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of the raspberry is a different affair, and explainable in a different way; but I fear to take up valuable space now about what may not be interesting to everybody, and so will keep a shot in the locker ready to use in case of necessity.

Had I not been typically "demolished," I should have remained quiet as a zephyr, but thus roughly shaken, I take the liberty to tell the gentlemen of the Woolhope Club that they must "look out for squalls," as if I can "raise the wind" anyway in my behalf, I shall get up a breeze that may scatter about seeds that may produce something for their further observation.

Perhaps in another Court judgment may be reversed; but I hope my antagonistic friends may be present when the cause is again heard, and be lucky enough to escape entire demolition.

EDWIN LEES.

WEYMOUTH, *September 7th*, 1857.

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EXTRACT OF REPORT

OF

METEOROLOGICAL OBSERVATIONS

Taken at the HEREFORD INFIRMARY, from June 1st to December 31st, 1857, BY J. E. SMITH.

Mr. Smith, House Surgeon of the Infirmary, commences his report by enumerating the apparatus belonging to the Society that came into his possession on April 25th, and consisted of the following:—A Meteorological Observatory, Barrow's Barometer with attached Thermometer, Maximum Mercurial Thermometer, Minimum Spirit Thermometer, Black-bulb Maximum Mercurial Thermometer, Hygrometer consisting of a wet and dry-bulb Thermometer with glass for holding water, Rain Gauge, Graduated Glass Jar for measuring rainfall, and Glaisher's Hygrometrical Tables.

He then records the valuable aid he had in Mr. W. Glegg Bullock in making punctual note each day from the 1st June; so few occasions being missed as not to affect the averages importantly.

The Observations were taken twice in the 24 hours, viz.:—at 9 a.m. and 3 p.m. A general summary has been made out at the end of every month, a copy of which he regularly forwarded to Mr. Glaisher, and one to each of the local papers.

Mr. Smith suggests for your consideration the following additions to the instruments:—A good self-registering Anemometer, a proper Weathercock, another Rain Gauge, a Minimum Thermometer for the grass, Ozone Papers, and a Flood Gauge or River Gauge.

The following summary of the Meteorological Observations for the seven months from June 1st to December 31st, 1857, may contain points of interest to many of you, and be useful as a Record of Facts.

From the Table on the next page it will be seen that the BAROMETER rose highest in Decmber, but the highest mean was in November. It reached its lowest (28.563 inches) in October.

The THERMOMETER was highest in June, but the highest mean was in August. It was lowest, and the mean lowest, in November.

The DRIEST MONTH was June. The DAMPEST was December. Every month from September increased in humidity.

The ATMOSPHERE was lightest in August, and heaviest in December; its weight increasing throughout the Autumn to the end of the year.

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Month.	Barometer.			Thermometers.			Hygrometer.		Rain.		Cloud.		Wind.			
	Highest.	Lowest.	Mean.	Highest.	Lowest.	Mean.	Degree of humidity, saturation 1000.	Weight of a cubic foot of air in grains.	Quantity in inches.	No. of Days.	Average amount (10)	No. of Clear Days.	No. of Days. N.	E.	S.	W.
	IN.	IN.	IN.	°	°	°										
June	30.236	29.380	29.863	89.1	38.7	65.5	702	518.4	?	13	5.5	8	6	6	19	10
July	30.075	29.460	29.749	82.8	45.0	64.2	766	518.3	2.64	11	7.	?	9	0	10	27
August	30.114	29.461	29.762	88.8	43.7	66.1	874	517	4.55	?	5.4	?	0	7	0	24
												Totals ..	15	13	29	61
September.	30.197	29.237	29.686	79.6	34.7	62.2	849	519.9	2.23	17	6.7	10	5	8	17	13
October ...	29.972	28.563	29.600	71.2	31.3	54.8	887	527.7	3.49	19	8	9	4	7	11	15
November .	30.503	29.049	29.871	60.7	25.2	45.3	858	543.9	2.12	11	7.6	9	10	15	8	12
												Totals..	19	30	36	40
December..	30.437	29.379	30.046	58.3	30.2	46.5	899	544.5	.38	13 l.s.	7	8	2	2	16	21
												Totals..	36	45	81	122

Thunderstorms.—Seven in June, two in July, one in August, and one in October. Solar Halo.—Observed June 4th. Lunar Halo.—Observed September 24th. Shooting Stars.—July and August, several; November was too cloudy; in December one was seen below the clouds (ci-cu). Fog Prevalent.—In the evenings of June and August; mornings in September; very prevalent in October, November, and December. Wye Rose Considerably.—Several times in July and December; once in September, October, and November. Lowest in August. Rain—Remarkable—fell on June 21st, August 13th, November 3rd, December 3rd. Several times in September. Snow—November 25th. Frost.—September 21st and 26th; October and December several days. Diseases Prevalent.—Smallpox from July to October; Diarrhœa in August, September, and October; Papular in August; Diphtherite in December. Martins Left October 1st and 8th; a few afterwards. Vegetation.—Tender annuals in flower to the end of November. Spring flowers in bloom in December. Very mild Autumn and December.

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RAIN.—The greatest amount fell in August; the smallest in December.

The greatest number of rainy days was in October. The smallest number in July and November. The rain in December consisted chiefly of light showers.

CLOUD.—August was the brightest month; October was the darkest.

WIND.—Westerly winds prevailed throughout this period, about 2½ to 1 over the East wind, about 5 to 1 in the first quarter, and 4 to 3 in the last.

South winds prevailed over North winds in each quarter about 2 to 1.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING,

TUESDAY, JANUARY 26TH, 1858.

The Annual Meeting was held in this City on Tuesday, January 26th, when there was a numerous attendance of members. The Chair was occupied by the Rev. J. F. Crouch, of Pembridge, the President, Mr. C. Lingen, being unavoidably absent. The Hon. Secretary read the Minutes of the last meeting, after which Mr. Charles Bodenham, of Rotherwas, who was nominated at a former meeting, was elected a member. A Statement of Accounts was then submitted to the meeting, and we are glad to observe that the funds of the Club show a considerable surplus in hand.

A highly interesting report was handed in by Mr. J. E. Smith, of the Infirmary, who has kindly conducted the Meteorological observations for the Club from the 1st of June last. The very careful manner in which these observations have been made entitle Mr. Smith, not only to the thanks of the Club, which were cordially voted to him, but also to the thanks of scientific men generally, for such an important contribution to the statistics of Meteorology. We are glad to understand that Mr. Smith continues the observations for the ensuing year. It appears that the observations have been taken twice in the 24 hours, and that a general summary has been made out at the end of every month, a copy of which has been forwarded to Mr. Glaisher and one to each of the Hereford newspapers.

Mr. Crouch read the following account of the

LARGE PEAR-TREE AT HOLME LACY,

BY REV. J. GREEN.

"This tree consists of 18 immense branches, which, proceeding in all directions, as from one common centre and lying upon the ground, appear to have broken themselves off, in consequence of their great length and weight, from an original parent stem. At first only partly separating, they seem eventually to have become rooted at the first point of contact with the earth, and then completing the separation and rising again from the earth in a peculiarly twisted shape, each branch has at length attained the bulk of a large ordinary tree.

Although much of the tree has been cut away by former residents at the Vicarage, the ground still covered by it measures 57 yards in one direction, and in another, at about right-angles with it, 69 yards."

The Rev. J. Green has, however, traced it 65 yards in one direction and 103 yards in another, thus showing that at one time about 6,695 square yards must have been covered by this enormous tree.

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A most interesting collection of Old Red Sandstone fossils was exhibited by Mr. Salwey, and, amongst other rare Ichthyolites, the *Cephalaspis Salweyi*, described and figured by Mr. Salter, in the Transactions of the Geological Society. Mr. Salwey said that much attention had lately been given in Ireland to the study of the Old Red Sandstone series, and that in all parts of the country a remarkable fact had been observed, viz., the unconformability of the Upper Conglomerate of the Old Red to the underlying strata. Little had yet been done towards the working out of the Old Red Sandstone of Herefordshire, principally, he thought, from its unattractiveness in comparison with the underlying Silurian rocks, no fragment of which but yielded its organism. But it must be remembered that, although the geologist might labour for days amongst the rocks of the Old Red without success, he was rewarded at last, probably with a single fossil worth a whole waggon-load of Silurians. It had been well remarked that every man who hammered away for fossils in a quarry must not consider himself a geologist. There was real work to be done in Herefordshire. At the edges of the Coal Measures in various parts of the district there were many opportunities of studying the Upper beds of the Old Red, and he trusted the members would put their shoulders to the wheel, and work out the interesting problem suggested by the Irish explorations. He was not prepared to give a decided opinion as to whether the same phenomenon obtained in the Old Red Sandstone of Herefordshire; but, if it did, and he was inclined to think so, the result might be that the Conglomerate of the Old Red must henceforth be classed as the base of the Carboniferous system. Dr. Bevan observed that he lately examined the great escarpment of the Scyrrid, and thought he detected a general unconformability between the Conglomerate and the Lower beds; but he was not yet in a position to give a decided opinion upon it. He thought the subject one of great interest.

The retiring President's address was read by Mr. Crouch, and the cordial thanks of the Club were voted to Mr. C. Lingen, for his indefatigable and valuable exertions as their President for the past year.

Dr. Bevan, of Beaufort, is President of the Club for 1858, and the Secretaries were re-elected. The days and places of meeting for the year were fixed for

June 3rd, Ledbury.
July 20th, Bromyard.
August 24th, Usk.

ADDRESS

of the retiring President, CHARLES LINGEN, ESQ., M.D., read in his absence before the Members of the WOOLHOPE NATURALISTS' FIELD CLUB, at their Annual Meeting, held in Hereford, January 26th, 1858.

My year of office has closed, and now it becomes my duty—a somewhat embarrassing one I find—to give an account of our proceedings since you did me the honour, twelve months ago, to elect me your President; but I must first record my acknowledgments for the honour conferred, which I felt to be as

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unmerited, as it certainly was unexpected; indeed, had I known of your decision in time, I should have entreated you to reconsider, and reverse it; but I had no choice. My professional occupations, though scientific in their nature, only border on those branches of knowledge to which the attention of this Society is devoted, and leave little time for such pursuits. Being fully aware that those subjects demanded of your leader more than a general familiarity with them, I entered on my duties with timidity; yet, thanks to the efficient and ready help of my fellow-members, my duties have been lightened, and my presidential cycle has passed off very pleasantly as regards myself, and not fruitlessly as regards the Club; if success has attended its labours, the merit of that success is essentially its own.

It is from combinations such as these, scattered throughout the kingdom, that so much has been effected, and it is yet to be hoped for, in accumulating material for purposes of generalization, and for testing theories on a large scale; each member is expected to do something in his own department. In our case, I hope we may feel this Club has done its part. Nature herself exhibits phenomena illustrative of this idea; the vegetable kingdom, with which I claim to be more familiar, perhaps as prominently as any. The prodigious results attained by vital actions coincident and long-sustained, manifested in trees that excite our wonder by their bulk and solidity, and the products of the minutest contributions unceasingly deposited and sent downwards from the leaves. Again, the enormous amount and exceeding variety of nutriment for man and animals, stored up in form of grains, fruits, or leaves: the supply, too, of silk and of cotton, that give clothing to half the civilized world, illustrate the same fact. Let these serve to remind us how essential is individual labour, and how much may be done by combined energy in the natural sciences.

I am indebted to so many of our friends for aid in preparing my report, that I find it difficult to make acknowledgments—yet I must mention especially the assistance I had from Mr. Lightbody, Mr. Salwey, Mr. Barker, Mr. Banks, and Mr. Cocking, in the Geological department; to Mr. Edmunds I owe much in the Botanical section; and to Mr. Smith for his accurate observations on Meteorology, so ably drawn up.

We now turn to our three meetings during the year. The first, fixed for Tarrington, a convenient place whence to explore the "Woolhope Valley of Elevation," came off on the second of June, and as we were honoured by the company of the Malvern Club, we mustered much stronger than usual—breakfasted at the "Foley Arms"—after which we visited the mansion and gardens at Stoke Edith; Lady Emily Foley, who was from home, having kindly ordered them to be thrown open for our inspection.

We next proceeded to the "Landslip," a spot conspicuous from afar to the tourist, and of great interest to the geologist. The obvious cause of this enormous "slip," was percolation of surface water: it took place suddenly some twenty years ago. The rock itself consists of upper beds of Aymestry Limestone, composed for the most part of Madrepores, Corals, and Shells of the

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Pentamerus, Atrypa, Leptæna, Orthis Orbicularis, Rhynconella, &c.; but time and weather are fast effacing the memoranda, and vegetation is attempting to conceal the masses of rock that lie scattered over an area of two or three acres,

"Like crags and rocks confusedly hurled,
The fragments of an earlier world."

In proceeding hence along the outer northern border of the great upheaved valley, the botanist recognised an abundance of the Centaurea Scabiosa and Saxafraga granulata. The party now proceeded towards the British Camp, known by the name of the Saxon "St. Ethelbert," where part of the earthworks are still discernible: hence were brought within view classic "Siluria," the Syenite of the Malverns, the Basalt of Titterstone, the Old Red of Radnorshire and Breconshire, the Cornstone ridges of Herefordshire, and the Limestone wall of the Forest of Dean, with the Oolitic formations of the Severn and Cotteswold. It was on this spot that the Club experienced the hospitality of Mr. Evans, of Sufton Court, who, though absent from the mansion, had ordered there an excellent supply of refreshments. After dispensing these beneath the lofty well-known Firs, we proceeded to Hutton's or "Adam's Rocks," at the eastern edge of the camp. From this place the "Valley of Elevation" is seen at a glance, and the central dome of Caradoc Sandstone rises through the deposits before you to the south-east.

The geologists of the party then made for the Dormington Limekilns, as mentioned elsewhere; the botanists met with Paris quadrifolia, Hieracium murorum, Geranium lucidum, Helleborus fœtidus, and viridis; also the Allium ursinum, or Wild Garlic, in abundance. In Dormington Wood, and near the Limekilns, were found the Ranunculus parviflora, and the Columbine or Aquilegia vulgaris, Chlora perfoliata, Erodium cicutarium, Filago minima, and Verbena Lantana; the Convallaria majalis was also met with plentifully in Checkley Wood.

We dined at the Foley Arms, and were joined by the Members of the Malvern Club and several visitors. After dinner Mr. Symonds (who had been prevented by indisposition from joining us at Adam's Rocks, and there giving the party the benefit of his complete knowledge of the subject, and the locality, by a lecture on the spot) favoured us with an able address, noticing recent important discoveries in geology, such as animal remains found in the Longmynd Rocks, near Church Stretton, hitherto believed to be azoic: the discovery of the remains of fish in the South Wales Coal Fields by Dr. Bevan, and of a highly organized flowering plant in the Newcastle Coal Shale: also the new light thrown on the "tile-stones" by the researches of Mr. Banks, and the greatly enlarged range over which Trilobitic life extended, &c. Then followed an animated discussion, sustained chiefly by Mr. Lees, of Worcester, and Mr. Flavell Edmunds, of Hereford, on the sudden appearance of plants, rare in the district, in railway cuttings; Mr. Edmunds maintained that they clearly resulted from the germination of seeds, buried for ages, but still retaining vitality; Mr. Lees considered that such seeds must have been brought thither by the winds, and rejected the admissibility of the other explanation.

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Your President then called attention to an interesting specimen of a hybridized tree from the garden of Mr. Godsall, of Hereford. Its stock was a yellow Laburnum, which had been budded with a purple one, and for several years produced only the purple flower of a Laburnum; now, however, besides here and there perfect purple and perfect yellow flowers, appeared a third and distinct kind, the Cytisus, as separate and as perfect as either of the others; indeed, the small branch which was shown had all three on it. Mr. Elmes Steele subsequently wrote that Mr. Saunders, of Abergavenny, had a tree in his nursery showing the same facts. Mr. Blashill also reported a similar case in the nursery of Mr. McPherson, of Plaistow, Essex. Several speculations as to the cause of this most remarkable fact were hazarded, but it was eventually allowed that the whole was the result of laws purely vital and beyond our scrutiny; it is curious that in each case the Cytisus blossom was the last, by several years, to appear; one thing appears proven at all events, namely, the very close affinity of these several plants to each other. After a brief lecture from the President on seeds, and the essential differences 'twixt the seeds of flowering and the spores of non-flowering plants—the *chief* distinctions being, that the former possess an embryo ready formed, the latter being formed at the time of germination—the meeting broke up.

Letters addressed to the President were read, among others from Sir Roderick Murchison, also from Professor Sedgwick and Mr. Lewis, expressive of their regrets at being unable to attend. The former venerable geologist, alluding to his early associations with the locality, and to a recent visit to it with Professor Ramsay, added, "I assure you that I never can visit that wonderful scene too often, and that I infinitely regret being prevented doing so on this occasion."

The second meeting, on July 21st, was at Ludlow; "Jupiter was not propitious"—the early part of the day was wet, yet we mustered well, and 22 sat down to dinner. The first rendezvous was Forge Bridge, the entrance on the Downton Silurian district; here the fine-grained compact Downton Limestone (a capital building stone) exhibits the topmost member of the Silurian system, and therefore the deposit immediately inferior to the "Old Red." Col. Colvin acted as our guide, and conveyed a cordial invitation from Mr. Tarratt to lunch at the Castle, which the Club accepted, though they had to regret the unavoidable absence of Mr. Tarratt.

The geology of the day is recorded in another place. Among the plants bagged by botanists were Polypodium dryopteris, and Aspidium filix fœmina; Cystopteris fragilis, Cetarach officinarum, and many more common ferns; the Trifolium arvense, Campanula trachelium, Fedia carinata, were among the Phanarogamous plants. We dined at Ludlow, after which Mr. Ballard exhibited specimens of wood (of the oak and poplar) illustrating the different results of artificial and natural pruning; he remarked that long and careful observation convinced him that artificial pruning was an error, for as in these cases the new wood blended imperfectly with the wounded part, leaving either a cavity or a knot, calculated to spoil the timber; and that such was not the case where pruning was the effect exclusively of a natural process. This led to a discussion on the nature of "adventitious buds," or buds produced otherwise than from the axilla

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of the leaf (the ordinary or normal source), as for instance from roots of some trees—the elm, the cherry, and the acacia; or from other parts of the ascending axis of certain trees—those of the willow and ash for instance, which have the power to produce adventitious buds in abundance, as shewn by the ready supply of hop-poles from the branches produced by these buds. Your President took occasion to remark that to the late Mr. Knight, of Downton, is due the merit of first calling special attention to the elucidation of this most interesting fact—the distinction between the ordinary leaf-bud and the adventitious one; and then proceeded by the aid of diagrams, to compare the flower-bud with the leaf-bud, and to show that each part of the flower is really a modification of a leaf, or in other words, is made out of a leaf, and that the flower-bud in all important respects is the analogue of the leaf-bud, but destined for a different object, and a briefer existence.

Mr. Cocking exhibited various specimens of Protaster, and gave a brief history of their discovery in the Downton rocks. The Rev. J. Green gave a description of a curious and nearly prostrate pear tree, well known as "the Big Pear Tree," in the Vicarage garden of Holme Lacy. It is remarkable from the circumstance of its slender and disproportionately long branches having extended in all directions, and then become depressed, so as to reach the ground, where eventually some of them have taken root, and thus become independent centres, if not detached trees! There are now about 18 of these branches, which from their peculiar spiral growth have a fantastic appearance, and cover a space of nearly 4,000 square yards; in years past it was known to cover nearly 7,000 yards; different occupiers, however, of the Vicarage, have cut away many of the limbs or centres. It has been said that 20 hogsheads of perry have been made in one year from this tree. There is a similar but smaller and younger tree in a meadow near, evidently grafted from this one. The spreading and spiral tendency of the branches is peculiar to the sort; the rooting of prostrate branches of such magnitude is perhaps without parallel in a pear tree, and worthy of record.

Our last gathering was at Shucknall Hill, Weston Beggard, selected for exploring the precipitous upcast of Silurian rocks there, the "Old Red" in the vale separating it on the south-east from the Woolhope elevation; the "Trap" Dyke near Hagley Park, Bartestree, and the famed "Dome of Hagley," lie to the west of it. The route comprising the opposite side of the valley was chosen for the first meeting of the year. We commenced at Westhide, on the north slope of Shucknall Hill, where we were hospitably entertained at the Vicarage by the Rev. Henry Bulmer. Here a prodigious elm in his lawn gave occasion for a discussion on the age of trees, and their powers of repairing injuries. Much of its centre or heart-wood was decayed and gone, but by extraordinary efforts masses of new wood had found their way inwards, and in a fashion repaired the loss, by the formation of a spurious heart-wood. The party now made its way over the Hill, visiting quarries open here and there, and finally to the abrupt section that faces the south, and is so conspicuous from the Tarrington road, but were not successful in obtaining new fossils. Next followed the "Trap Dyke;" here a conical jet of Toadstone was traced through the Sandstone and Limestone,

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which latter still bears evident marks of the molten mass that was forced through it. It is evident that the erupted matter did not overflow, but cooled down as it reached the surface; it was noticed also, that Sandstone on either side of the chasm lay horizontally, probably owing, as was suggested by Mr. T. T. Davies, to the abrupt and sudden manner of its intrusion. Near this is "the Dome," an upheaved mass of Downton Sandstone and Upper Ludlow—the scene of the discovery of the Fish bed by the late lamented Mr. Scobie, the first Honorary Secretary of the Club. We dined at Hereford (Mitre Hotel). Afterwards the Honorary Secretary mentioned the discovery of the Rowlstone fossil alluded to elsewhere (the specimen itself now being at the Museum of Economic Geology)—its discovery is esteemed one of the highest importance. Dr. Bull called attention to the rapid spread of the Anacharis, and its presence in our Canal; also to the circumstance that it had been found at Northampton in 1836, and that Dr. Hooker had noticed it in Scotland in 1841. Mr. Flavell Edmunds was now requested to revert to a subject discussed at Tarrington—that of buried seeds—he gave many instances, chiefly from excavations in railway cuttings, where plants, fresh to the district, had sprung up in great abundance; illustrating as he believed, the admitted fact that seeds may retain their vitality for an almost indefinite period, if separated from those essentials to germination, air, moisture, warmth, and darkness. Your President instanced a fact in support of these views, in the sudden appearance, and very great amount, of the Equisetum in the Brick-yard at Shelwick, alongside the Shrewsbury and Hereford Railway, where previously none had been observed. Botanists made no important "finds." Campanula patula and Lepidium Smithii were the most notable.

THE GEOLOGICAL SUMMARY.

It will be expected that an Institution, whose field is Siluria, and which even takes its name from the most remarkable spot of that remarkable region—should have a word to say about geology. Nor will that expectation be disappointed, seeing that it is our good fortune to number among ourselves several acute and successful observers. No special discoveries, that I am aware of, were made by the members in their Field Days during the past year, as had been the case in a former year, when they found the footprints of a crustacean on the sandstone slabs in the large quarry at Puddlestone; yet by the kindness of Mr. Salwey and Mr. Lightbody and Mr. Banks, as well as our late President, the Rev. William Symonds, I am enabled to announce to you the discovery of several interesting fossils in different localities of this County, or its immediate neighbourhood.

In the Ludlow district, the Lower Ludlow beds at Church Hill, near Downton, have yielded to the persevering researches of the two former gentlemen, Mr. Cocking, and other local observers, at least eleven different species of Asterias, or Starfish, which have been named Protaster; a new genus intermediate between the Trilobite and the Limulus, and named Limuloides; three or four species of Phyllopod, a crustacean resembling the Shrimp, with a beautiful tail, and a new species of Cornularia.

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In the same neighbourhood, at Forge Bridge, though in the Upper Ludlow bed, several imperfect specimens of the Pterygotus were found. In a similar situation, namely, at the top of the Upper Ludlow Rocks, in Stoke Edith Park, Mr. Banks reminds me that the members found a layer of carbonised fucoid plants, as well as a small species of the Trilobite family, which has been named Lichas Bucklandi (or Hirsutus). At Ludford, the same beds—those immediately below the Downton Sandstone—have yielded remains of Pteraspis, Cephalaspis, Eurypterus, and Pterygotus, also some pustulated curved plates, having teeth on the outside of the curve; they are supposed to belong to a fish. The railway cuttings of the same neighbourhood, through the beds at the bottom of the "Old Red," have furnished an immense quantity of remains of the Pterygotus, of two different species, Pterygotus Anglicus and Pterygotus Acuminatus; also two species of Eurypterus, and a Cephalaspis, named by Sir P. Egerton, "Ornatus," besides a smaller specimen which he considers to be generically distinct, and names Auchenaspis Salteri. The same beds have also supplied specimens of the spines and skin of Plectrodus mirabilis, and two species of bivalve Crustaceans. The lower strata of the "Old Red" on the banks of the Teme, near Downton, contain a "fish bed," in which have been found the Pterygotus, Eurypterus, Cephalaspis Murchisoni, with the Ornichus and Lingula.

Our friend Mr. Symonds, has also brought into notice a fine specimen of a crustacean allied to Eurypterus, which was discovered by an intelligent working man at Rowlstone, near Ewyas Harold, in this County, in a Sandstone bed of the upper Cornstones of the "Old Red" at Rowlstone, and which, through the kindness of the Rev. Mr. Wenman, in whose possession it now is, many of us have had the opportunity to examine.

Various fossils from this county and neighbourhood are to be described by Mr. Salter in the forthcoming number of the Decades of the Geological Society.

The Quarterly Journal of the Geological Society for August, 1857, contains a description, by Sir R. Murchison and Sir P. Egerton, of some entirely new fossil fishes, discovered by Mr. Salwey and Mr. Lightbody; by the former in the "Old Red" of Acton Beauchamp, and by the latter in the bone-beds of Lucton.

And last but not least, the discoveries of organic remains in water, as low down in the scale as the Cambrian Rocks, have been made in the neighbourhood of the Malvern Hills by Dr. Grindrod, of Malvern. The green Hollybush Sandstone of the Malverns are generally ranked as of Cambrian age, inasmuch as the black shales above them contain Trilobites, found in other parts of Europe in strata older than the base of the Llandilo flags. The fossils discovered by Dr. Grindrod are the tubes of ancient marine worms, which have been named "Arenicola antiquissima." It would appear more than probable, from certain specimens of Trilobites associated with shells—which as we learn from the Edinburgh Philosophical Journal, were lately exhibited by Professor Dawa at the American Association for the Advancement of Science, as having been discovered in a deposit called the Potsdam Sandstone of the Cambrian age—that the Cambrian deposit was by no means so destitute of life as has been generally supposed.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, THURSDAY, JUNE 3RD, 1858.

LEDBURY.

The First Meeting of the season of this Club took place at Ledbury on Thursday, June 3rd, when the members were joined by members of the Malvern, Worcestershire, and Cotteswold Clubs.

The following Members were present:—WOOLHOPE CLUB—Dr. Bevan, President, Mr. R. M. Lingwood, Mr. R. Lightbody, Dr. Steele, Rev. J. H. Barker, Messrs. T. Curley, A. Thompson, P. Ballard, G. Cocking, P. Baylis, &c.; MALVERN CLUB—Rev. W. S. Symonds, F.G.S., President, Rev. Reginald Hill, Rev. C. Haywood, Mr. John Jones, and Rev. J. Kent, &c.; WORCESTERSHIRE CLUB—Edwin Lees, Esq., F.L.S., Vice-President; Messrs. J. S. Walker, Edward Gillam, R. Smith, Rev. W. Thorne, Mr. Henry C. Vernon, Mr. Herbert Budd, Captain Pointing, &c.

The whole of the Clubs and their friends, numbering 60 or 70, assembled on the summit of Braidlow Hill, near Ledbury, where the Rev. W. S. Symonds delivered a very able and instructive lecture on the Geological formation of the Malvern range of hills, explaining the upheaval and contortion of the strata. He dwelt with great feeling on the loss to science of the late lamented Hugh Strickland, who some three or four years ago, on a similar occasion, delivered a lecture on Ragged Stone Hill.

The lecturer recommended that the day's ramble should begin by visiting a fish-bed lately discovered by two working men, who devote their leisure hours to the pursuits of geology. The descent was made to the exposure in a vertical escarpment of Ludlow Rocks at Dog Hill, and proceeding thence to the examination of a supposed bone-bed on Wall Hills, the threatening aspect of the weather and the rain commencing to fall induced the party to return to the Feathers Inn, where Dr. Bevan lectured on fossils lately discovered by him in the Coal, which are unique, consisting of Ammonites and other shells, which have yet to be named. He treated of a deposit of Marine Shells found by him in the Coal Measures near Beaufort, in the South Wales Coal basin.

Mr. Jones, of Gloucester, exhibited a new instrument called a Gyroscope, which demonstrates the fixity of the earth's axis in the position it was placed in when the earth began to revolve. We may refer to a description of this instrument at some future time.

Mr. Lees read a paper on "The Colouring given to Nature by Cryptogamic Vegetation," which caused a good deal of discussion. His theory of the non-

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vitality of seeds buried for any length of time in the ground was opposed by several gentlemen. Mr. Lees humourously attributed Mr. Edmunds' absence to a fear of another encounter with him; in fact, he (Mr. Lees) considered that "he had knocked the WIND out of him." (Laughter).

Mr. Curley exhibited a large horn of some antediluvian animal, found in the excavation of the Newport Docks, 38 feet below the surface which the Rev. W. S. Symonds intends to send to Professor Owen for the purpose of determining the class of animal to which it belonged.

About 40 gentlemen sat down to an excellent dinner, after which several of the members proceeded to visit the fish-bed, where they found fish-scales in abundance.

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, TUESDAY, JULY 20TH, 1858.

BROMYARD.

The Second Meeting of this Club for the present year was held at Bromyard, on Tuesday, July 20th, under the presidency of Mr. C. Lingen, in the absence of the President, Dr. Bevan, of Beaufort. There were present also, Mr. Suter, Hon. Sec., Mr. Salwey, Mr. Lightbody, and Mr. Harley, of Ludlow; Mr. Curley, Dr. Rowan, Mr. Edmunds, of Hereford, &c. The party met at breakfast at the Falcon Hotel between 9 and 10 a.m., and afterwards proceeded to transact the usual business. The Rev. C. Smith, of Tarrington, was unanimously elected a member, and another gentleman was nominated, to be balloted for at next meeting, which was fixed for August 17th, at Usk. Progress was reported on the subject of the Flora of the County, a complete account of which is being prepared by the Rev. W. H. Purchas.

After breakfast the party started for an exploring ramble, Mr. Salwey and Mr. Lingen acting as guides.

The party first visited the quarries on Bromyard Down, and thence made their way by the Hawkins to the interesting old Church of Stanford Bishop. Here a few minutes only were allowed for a glance at the fine Norman doorway, and other interesting features of the Church. In passing, the patriarchal yew tree, 15 or 16 feet in girth, and probably six or seven centuries old, which shades the north side of the churchyard, was greatly admired.

From Stanford Bishop Church the party made their way through the Church-house dingle to Sevington, visiting divers quarries, and putting "crushing questions" to stone heaps wherever found. Until they reached Sevington, however, their researches were fruitless. There, on the contrary, a mass of Cornstone fragments yielded a number of good specimens of *Pteraspis*, *Cephalaspis*, &c.

A visit to another quarry, lying eastward of the house, was then made, after which the party made their way to Ponton, and thence through the Acton Beauchamp dingle to Hingston, returning through Avenbury Churchyard to Bromyard.

The weather was delightful, the passing clouds frequently veiling the sun, and thus rendering the intervals of his fierce glare more tolerable. The slight fatigues of the journey were lightened by the hospitality shown by Mr. Philpotts, of The Hawkins, and Mr. Brown, of Sevington, the latter gentleman kindly entertaining the party at an *al fresco* lunch on his lawn.

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For the botanist, the ramble yielded nothing fresh, the extent of ground covered being too great to allow of that thorough examination which is necessary for the exploration of a district. As in other instances, *Campanula patula* was found marking out the Cornstone ridges, while the downs and elevated places were adorned with the characteristic *Galium saxatile*; the marshy hedge-bottoms yielded *G. Witheringii* and *palustris*, and the walls were becoming golden-hued with the rich yellow flowers of *Sedum rupestre*. In one instance, *Sempervivum tectorum*, evidently wild, was found growing on a wall.

At 6 p.m., the hungry and tired explorers met at the Falcon, and recruited their strength by an excellent dinner. During the pleasant hour which they afterwards spent together, Dr. Rowan exhibited and explained a simple contrivance for ascertaining in a few minutes, the percentage of lime in any given sample of limestone, and proceeded to experiment with it in a very successful manner. It consists of a large glass jar or bottle with a perforated cork, into which fits a smaller glass vessel and a glass syphon, one leg of which reaches down to near the bottom of the jar. A small tube also passes through the cork. A given quantity of limestone, bruised, with a small quantity of water is put into the jar; the whole is then weighed; the inner vessel is filled with hydrochloric acid, and the jar is exhausted of air by suction through the tube. A partial vacuum being thus created, the acid rushes through the syphon, and falls upon the limestone, producing an effervescence. The carbonic acid being expelled through the tube, the residuum is chlorite of lime. On the jar being again weighed, the loss from the former weighing is deducted, and the actual amount of lime is thus ascertained. Of course, the weighing is a matter of great nicety, but the saving of time in analysis by this method is very considerable, while the practical value of a cheap and easy test of the value of limestone in agriculture is obvious.

The party broke up at 8 p.m., having spent a very agreeable day.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, TUESDAY, AUGUST 17TH, 1858.

USK.

The Club held its Third and last Field Meeting for the season at Usk, on Tuesday, the 17th. The following members and their friends were present:—The President, Dr. Bevan; Professor Melville, J. C. Salter, Esq., Rev. W. S. Symonds, Mr. Lingwood, Mr. Bodenham, Rev. J. F. Crouch, Mr. Lightbody, Rev. J. D. La Touche, Captain Symonds, Mr. Beddoe, Mr. Cocking, Mr. Curley, Mr. Marston, Mr. Thompson, Mr. Purchas, Rev. C. Smith, Mr. Smith, Mr. Suter.

The intended excursion lay between the Little Mill Junction, on the Newport, Abergavenny, and Hereford Railway, and the town of Usk, but, at an early hour in the morning, rain commenced to fall in torrents, and as every indication existed of a thoroughly wet day, the party proceeded direct by railway to Usk.

At the Salmon Hotel, the usual business having been transacted, Professor Melville favoured the Club with an interesting lecture on the Palæozoic rocks.

After having in a very clear, though succinct manner, explained their characteristic features, composition and sequence, he proceeded to say that the subject of Conglomerates having occupied his attention for some time, conclusions had been forced upon his mind respecting their origin, which were gradually forcing themselves likewise on the minds of all practical geologists. He would not say that his interpretation of the phenomena was absolutely the true one. Anxious only correctly to read the lessons that nature taught, he was willing to be convinced if in error.

Up to a very late period he was a firm adherent of what might be called the Lyellian School of Physical Geology, *i.e.*, he thought that all the great changes which had taken place in the earth's crust, such as the upheaval of mountain chains, &c., &c., were due to forces which had been exerted slowly and unremittingly from the beginning of time, and which continued to the present in gradual operation. His observations, however, had led him to regard the present period as a period of absolute repose; he thought that the earthquakes and volcanoes, upon the existence of which so much stress had been laid, produced little or only local effects, and that strictly speaking they were the concomitants of a period of quiescence, and not of disturbance.

The Conglomerate beds interspersed amongst the sedimentary rocks would, he thought, be found always to indicate violent and unusual disturbance of the earth's crust at the time of their deposition; whenever, therefore, such appeared

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to be looked for, disturbing causes were close at hand, or in some other region upon the same Geological platform.

A mass of evidence had already been accumulated corroborative of this view, and the proofs are almost sufficient to enable him to assert that the great geological epochs have been ushered in by such periods of real disturbance, and that quiescence, such as now obtains, reigned between.

Beds of Conglomerate also had been found to form the boundary between one system of life and another. Take, for example, from this locality, the Old Red Conglomerate, which seems to usher in the Carboniferous series. The same catastrophe which produced the Conglomerate seems also with only a very few exceptions, to have annihilated the then existing animate creation.

He did not mean to assert that there was there a great and positive break in the chain of being, but what he did mean was that, although certain species appeared to have lived on, there seemed to take place a change in the conditions of the planet unfavourable to life, and that the great proportion of then existing species perished, a few being carried forward into the subsequent creation.

He concluded by recommending an earnest study of the Conglomerates, in relation to evidences of disturbance occurring on the same geological platform.

Mr. Salter said that, when his friend had first propounded the opinions with which he had just favoured the meeting, he was disposed to differ from him *in toto*; but now, having studied the evidence for himself, he believed there was little difference of opinion between them. He might mention one fact, which went to prove that during the present geological period no fresh creation had taken place. It is stated by Edward Forbes that the Baltic is a Sea of very recent formation, extending far up into the Arctic regions. It may be almost called an inland sea, yet its inhabitants have migrated upwards from its mouth. Though unadapted to a high northern latitude, still there the animals are, gradually creeping upwards into those regions, stunted and dwarfed, it is true, yet at the farthest point showing no specific dissimilarity. Almost the same may be said of the Mediterranean Sea.

He would wish to draw particular attention to the Conglomerate of the "Old Red." There were people bold enough to assert that the *Holoptychius* was a fresh-water fish, and that the deposit showed other evidence of not being of marine origin. This was a point he was inclined to dispute, and it would prove of great service to science if gentlemen would devote a little attention to these rocks. To be sure, the formation yields its fossils slowly, and it was rather discouraging to hammer away for a whole day without reward; but it must be remembered that one discovery was abundant success. And if the remains of shark-like fishes could be detected, he believed it would go far to settle the question as these fishes never inhabited fresh water.

Another subject he would like to bring under the notice of geologists—the desirability of collecting in this locality traces of annelids and other similar markings on the rocks. There were doubtless many ancient, soft-bodied animals,

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of which we could never know anything except by the tracks they had left behind them.

The Rev. W. S. Symonds made some eloquent observations on Professor Melville's opinions, arguing in favour of a continual chain of animal life, and appealing to Mr. Salter, as the greatest Palæontologist of the present day, to support the opinion which he had seen in his hand-writing, that the chain of life was continuous and progressive, and that there existed no sudden break, such as Professor Melville's theory would seem to require.

Professor Melville replied, and after a conversation sustained by Mr. Salter, Dr. Bevan, Mr. Cocking, and Rev. J. F. Crouch, Mr. Symonds humourously retracted his objections, having, he said, brought them forward merely to give rise to the discussion which had taken place.

After dinner a glimpse of sunshine induced the members to sally forth. The escarpment of Aymestrey limestone (query Wenlock ?) at Llanbadoc was visited, under the guidance of Mr. Salter. Llangibby was the next point, but the rain again commenced to fall in torrents, and the party retraced their steps to Usk, where they arrived in time for the 6-30 train for Hereford.

Notwithstanding the unfavourable state of the weather, we are happy to state that the party enjoyed a very agreeable and instructive excursion. In consequence of the unfavourable state of the weather, we have no botanical report.

IN MEMORY OF THE LATE REV. T. T. LEWIS.

A name occurring in this week's obituary, calls for some notice in our columns. By the death of our late excellent friend, the Rev. Thomas Taylor Lewis, M.A., Vicar of Bridstow, Herefordshire has lost one of its best and most accomplished men. We may claim him one of its worthies, for although born out of the limits of the county, his life has been spent within it, and to it he was deeply attached. Fond of natural history and of science in all its branches, a residence at Aymestrey as Curate of that parish, turned his attention, in leisure moments, to the investigation of the geological structure of that most interesting district.

The geology of this part of England was at that time unexplored and forsaken. Sir Roderick Murchison's Silurian researches had not commenced; there were no Ordnance Surveys to direct the student; and therefore we can hardly overrate the value of the services which Mr. Lewis rendered by his silent and unobtrusive labours thirty years ago.

"My acquaintance with Aymestrey," to use Mr. Lewis's own words addressed to Dr. Fitton, the eminent geologist, some years later, "commenced with my entering on the Curacy of the parish in the autumn of 1826. Its natural beauties soon invited my attention, which was likewise directed to its natural and artificial sections, and its regular, but broken structure, and I began at once very zealously to collect the fossils which were everywhere in abundance strewed over the roads and fields, and to dispose of them in drawers, keeping those of each

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stratum separate, and distinguishing the now named 'Upper and Lower Ludlow rocks' by the names of 'Grauwacke and Pendle' (the latter being the local name); and the Aymestrey and Wenlock limestones by Pentamerus, and Coral or Nodular limestone; the former from its abounding in the Pentamerus Knightii; and the latter from its great richness in corals, and the appearance which its weathered beds assumed in this neighbourhood, even where they were considered worth working for the kilns. I had very soon a collection, extending from the junction of the Old Red Sandstone with the Grauwacke, down to the Wenlock Shale (or nodular strata), and had fairly traced these beds westward and eastward, to the full extent of this parish, 1829; and along the prolongation of the Croft Ambrey and Gatley escarpments towards Ludlow; and in the outliers of Tinker's Hill and Cainham Camp, on the other side of the river Teme, in the direction of the Clee Hills; and likewise in the neighbourhood of Leintwardine."

The Edinburgh Review, when treating subsequently of the Silurian system, and speaking of Mr. Lewis's labours in this district says, "We have had the pleasure of examining a part of that beautiful and instructive country under his guidance, and are thus enabled to give personal testimony to his exact acquaintance with its structure; and not less cordially to the frankness and absence of pretension with which his knowledge is communicated. And we are satisfied that Mr. Lewis was the first person to ascertain that a series of what were called transition rocks, succeeds, conformably, to the Old Red Sandstone at Ludlow; to distinguish the groups of strata by many of their principal fossils; and to prove that in the tract immediately adjoining Aymestrey, and on the south of Bringewood chase, the strata, though thrown up and much disturbed, exhibited everywhere the same determined order of succession."

Sir Roderick Murchison, in his great work, *The Silurian System* (of which, by the bye, a third edition is announced by Mr. Murray), refers to the great assistance afforded him by Mr. Lewis's earlier labours. In treating of the now world-famed "Aymestrey limestone," he says he named it "after the beautiful village of Aymestrey, where the rock is fully and clearly laid open, and where its fossils contents have been elaborately worked out by my friend the Rev. T. T. Lewis."

It may appear superfluous to enlarge upon this point, or to say that the fossils named after Mr. Lewis (as the Lingula Lewisii, Cephalaspis Lewisii, Spirorbis Lewisii), must prepetuate his name in the mind of every student of Geology; but the "absence of pretension" which the Reviewer speaks of, and the love of retirement, prevented Mr. Lewis from taking that position before the public to which his talents and knowledge entitled him. He loved knowledge and science for their own sake, and cared not to have his name associated with this or that society. Nevertheless, he maintained an intimacy and correspondence with some of the most distinguished men of the day, especially in that field of knowledge to which his attention had been early directed, and with which he kept pace, notwithstanding that the circumstance of his appointment to the living of Bridstow withdrew him from Siluria propria.

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Although so diffident of his own powers, he was ever the encourager of others, and often sacrificed his own desire for retirement for the sake of stimulating the general zest for knowledge. His consent to take his turn in the Presidency over the meetings of the Woolhope Club of Naturalists illustrates this part of his character. Nor was his leisure engrossed by merely one branch of knowledge. Cambridge, his alma mater, had given him a sufficient knowledge of mathematics to fully appreciate the works of Newton, and the "Mechanique Celeste" of La Place was studied by him with delight.

It was, however, the observation of Nature, as exhibited in his every day walks through his parish, that seemed to be his great source of enjoyment. It was noticing this that led the author of the Silurian System to express a hope (alas! never realized) that "the application of his leisure hours to the cultivation of the natural history of his neighbourhood may one day enable Mr. Lewis to confer upon Aymestrey the celebrity which White has bequeathed to Selborne." At the same time his taste for and knowledge of antiquities, and care as an editor, admirably qualified him for the task of editing the "Letters of the Lady Brilliana Harley" for the Camden Society, placed in his hands for that purpose by Lady Frances Vernon Harcourt, and published in 1853.

We trust no one who reads this notice will suppose for one moment that the pursuits we have mentioned were permitted by Mr. Lewis to interfere with the duties of a country clergyman. Those duties were performed in an exemplary manner. At the time of the alteration in the administration of relief to the poor Mr. Lewis worked hard, and with the greatest success, in reconciling and adapting the new system to the wants of his own district, giving prominence to the undoubted advantages of the new law, and smoothing the harder features of its operation. The School and School-houses at Aymestrey and Bridstow, erected through his personal exertions, however assisted by others, bear testimony to his zeal for the Christian education of the children of his parishioners. While he held his religious opinions firmly, he was unobtrusive and free from everything like bigotry. Kind but discriminating in his charities, so gentle and affectionate, reproving with firmness where reproof was needed, and commending whenever he could do so with truth, Mr. Lewis's name (no less as a pastor, a neighbour, and a friend, than as a naturalist) well deserves this slight tribute to its memory at our hands.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING.

TUESDAY, JANUARY 25TH, 1859.

The Seventh Annual Meeting of the Club was held on Tuesday, January 25th, at the house of the Hon. Sec., Mr. J. A. F. Suter, in this City. In the unavoidable absence of the President (G. P. Bevan, Esq., M.D.) the Rev. J. F. Crouch was called to the Chair; and there were also present the Rev. J. H. Barker, Messrs. R. J. Griffiths, J. E. Smith, T. Curley, Philip Ballard, Flavell Edmunds, and the Assistant Hon. Sec., Mr. Arthur Thompson.

The minutes of the last meeting held at Usk in August last having been read, the Rev. Thomas West, of Ross (nominated at that meeting) was unanimously elected a member of the Club.

The Accounts having been passed, it was agreed, on the motion of Mr. Griffiths, to insert in Rule VI. certain words indicating the time and place at which the Annual Subscriptions shall in future be payable. The subscription will consequently be payable in future at the National Provincial Bank, on the 1st of May in each year for the year then ensuing.

The subject of the Flora of Herefordshire having been brought up by a question, it was stated that the Rev. W. H. Purchas (who had kindly undertaken the work) had come to the conclusion that it would be desirable to publish the Flora in parts, so as to allow of additions being made in the course of publication; and that the first portion is now in progress.

Some conversation ensued upon the subject of the preparation of a list of fossils found in the district of the Club, including the necessary information as to strata and locality, but the matter was allowed to stand over to the next Field Meeting.

Col. Colvin was unanimously requested to undertake the Presidency of the Club for the ensuing year.

Thanks were voted to the Hon Secretary and the Assistant Hon. Secretary, who were requested to continue their valuable services.

The address of the late President (Dr. Bevan) on quitting office was read by the Chairman.

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THE ADDRESS

Of the retiring President, G. P. Bevan, Esq., M.D., F.G.S., read in his absence before the Members of the Woolhope Naturalists' Field Club, at their Annual Meeting, held in Hereford, on Tuesday, January 25th, 1859, by the Chairman, The Rev. J. F. Crouch.

Gentlemen of the Woolhope Club,

The time has arrived when in accordance with the rules of our Society, I give up the reins of office to a new and worthier successor, and I do so the more gladly as I feel on looking back at the past year, that I have ill performed those duties which devolved upon me on undertaking the honourable post to which your kindness elected me. Whatever may have been my shortcomings as President of this Club, I can assure you that in ardent love for the science of Natural History, and particularly in interest for the welfare of our body, I yield to none. My chief difficulties during the past year have been, first, an accession of work to which I did not at all look forward at the commencement of the year, and secondly, the great distance at which I reside from our head-quarters, and indeed from the whole district which is the scene of our labours. The very earth iteslf has conspired against me in this matter, for although a Welshman, I am not so good a Silurian as I ought to be; and living amongst Coal Measures, I have been obliged, and I must say, not very unwillingly, to devote my principal attention to that interesting formation. In almost every science each man has his speciality, and in geology, more particularly, a speciality is necessary—for although every geologist should be fairly up in the general principles and features of all the rocks that compose our earth's surface, yet few of us can ever hope to reach the general perfect knowledge of a Lyell or a Mantell—but each in his department can carefully and thoroughly work out that formation in which circumstances have placed him; and even should he not succeed in becoming an authority in his department, the very humblest observer, if he observe with care and caution, is contributing to the more solid foundation of existing knowledge, and adding his mite to the ever increasing train of discovery.

It is the duty of the retiring President to chronicle the events of the past year in the proceedings of the Club, more particularly with regard to the excursions. With your permission, then, I intend in my address, first, to touch briefly upon the affairs of the Club, and second, to give a short outline of the geological events and discoveries that have taken place in the past year in the Palæozoic formations. First, then, the state of the Club, upon which, as regards the number of Members and the commercial state of affairs, we may congratulate ourselves and our Secretaries, though I fear they have often more trouble than they should have in obtaining the current subscriptions. But while congratulating ourselves on our full lists, we have to deplore a vacancy which will be long ere it is filled up. Death has robbed us of one of our Members—one, whose knowledge of science and contributions to geological discovery not only reflected honour on the Club of which he was so prominent a Member, but also on the whole body of English geologists. As a geologist, we are all aware how honourably the name of the

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Rev. T. T. Lewis was associated with the early labours in the Silurian strata, and of the important value attached to his discoveries by the greatest authorities of the day. As long as geology endures, the name of the Aymestrey limestone will ever bring back to memory the loss of our friend and late President, who was beloved and respected by all, as much for his private virtues as for his scientific attainments.

The proceedings of the past year have not been so satisfactory as those of other years, as regards the out-of-door work. Our excursions were respectively held at Ledbury, Bromyard, and Usk; though the first and last were considerably marred by unpropitious weather. At Ledbury, where we were joined by our friends of the Malvern, Cotteswold, and Worcestershire Clubs, we were fortunate enough to hear an interesting panoramic lecture from Mr. Symonds, on the summit of Braidlow Hill. But scarce was it finished, when Jupiter Pluvius and Jupiter Tonans put in an appearance, and drove us under cover, where, however, we passed a tolerably pleasant afternoon. At Usk the weather was still worse, and in point of geological work, none was done. I regret to say that I was not able to be present at the Bromyard meeting, which I understand was very pleasant and instructive, though attended by only a few Members. I do not, however, regard Field Days generally as occasions when much work is done, but what is of great importance, they are social gatherings where friends may meet and communicate to each other points of interest, new facts and theories, and all the latest intelligence in the several departments of Natural History, while the real work is done quietly and steadily, each one for himself, in his own locality. The Woolhope Club rejoices in several parties, thorough workers, who by their accumulation of new facts and specimens, are doing good service in the cause of geology. If there is one locality in the district on which I should like to see more attention bestowed, it is that of our head-quarters, the City of Hereford and its neighbourhood—the fluviatile deposits of the valleys of the Wye and Lugg, the classic valley of Woolhope itself, Hagley Dome, and other places, which might be more thoroughly worked out than they are at present.

With regard to the internal economy of the Club, a measure has been proposed which I hope ere long to see carried out, viz., the formation of a tabular list of fossils, arranged stratigraphically and locally, which have been found in the area embraced by the Woolhope Club. At present numbers of fossils, mostly typical, and many new and rare, are in the cabinets of our Members, unknown save to the select few; and not only to the Members of the Club would it be a guide to what the district has furnished, but also an incentive to add to the list—while it would at once put the geological stranger in possession of the key to the fossiliferous localities, and would serve as an important feeder to the general stream of discovery, besides elevating our Club to something more than a mere local gathering.

I will now, in a few words, make some remarks on the recent researches and proceedings that have taken place in the Palæozoic rocks within the last year or two. Scotland has been the scene of greatest interest, owing to the vast expanse of country which was until lately but little understood and worked out. Sir

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R. Murchison, who has been labouring hard at it, has pointed out, while laying down a more definite arrangement of the geological features of the country, many new and interesting facts, on which the new edition of Siluria, just published, has enlightened us. The Lower Silurian deposits in the northern part of Scotland, particularly in Sutherland, appear to be very different from the same deposits in this country, consisting of a series of quartzite with intercalated limestone highly crystalline, overlaid by quartzose and other crystalline rocks having a gneissose character. So little were these understood, that Professor Nicoll, of Aberdeen, was inclined to consider them as equivalents of the carboniferous rocks in the south of Scotland, while Hugh Miller regarded them as metamorphosed representatives of the Old Red Sandstone of the eastern coast. Mr. Peach, however, discovered in these crystalline rocks, fossils, which are determined to be of Lower Silurian age, consisting of a Serpulites (S. Macculochii) and a few fucoids from the quartzite, besides a series in the limestone—Maclurea, Ophiolite, Onchoceras, and Orthoceras, fossils which hitherto have been limited to the Lower Silurian series of North America, known as the Huronian rocks, and the limestones above them. With regard to the Upper Silurian beds, there have not been so many discoveries very lately—that is to say, in the old established Upper Silurian rocks—but it is in the disputed ground of the Passage-beds that the most important work is being done, and new creatures discovered in rocks which were formerly looked upon as unfossiliferous and uninviting. Some of the members of our Club, especially our Ludlow and Kington friends, have been foremost in developing the strange forms of Pterygotus, Eurypterus, Auchenaspis, Ceratiocaris, that we are now familiar with; nor must I forget the Starfish bed which has yielded such uncommon fossils as the Palæocoma, &c., to their diligent hammers. While they have been working out their transition beds to such good purpose, Mr. David Page has exhumed strange-looking forms from the Lanarkshire and Forfarshire beds, which until their exact positions have been defined, he styles Siluro-Devonian rocks. From the Tilestones of the former he has got Pterinea, Orthonota, Trinucleus, Avicula, Orthoceras, Eurypterus clavipes and Eurypterus spinipes, thus adding two new species to the twelve already known; while the Forfarshire flagstones, which appear at the base of the Old Red, have yielded the gigantic tube of the worm (Scolithus) and two new crustaceans, which have been named Kampecaris and Stylonurus, as well as a small fish with kite-like head, armed with five spines, called Ictinocephalus granulatus. In the same beds he has also found a Cyclopteris and Lepidodendron. Perhaps these are the equivalents of the beds at Trimpley, where Mr. Roberts also found vegetable remains. The Old Red, since the days when Hugh Miller wrote his admirable little volume, "The Old Red Sandstone," has been so divided and subdivided that it has had a narrow escape of dying away altogether; but fortunately for it, the opinions which were for giving half of it to the Carboniferous system and the other half to the Silurian, have changed, and the Old Red is still Old Red.

Again, it is in Scotland that the most important work has been done. Sir R. Murchison has finally classed the rocks in the north-east under three divisions: the lowermost being conglomerates and sandstones, the equivalents of the For-

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farshire beds and the lower Cornstones of this country; the middle series or Caithness flagstones, bituminous and calcareous; and third, the uppermost, consisting of yellow sandstones. These latter have been a *vexata quæstio;* for they have been described by Sir Richard Griffiths, in Ireland, as Carboniferous, as also by Mr. Jukes. Their proper place seems to be now definitely settled as the uppermost member of the Old Red, and the equivalents of the Dura-Den beds in Fifeshire, which have proved so rich in fish remains. In this country, the same beds are to be found, according to Mr Symonds and Dr. Melville, in the escarpment of the Daren, near Crickhowell, just underlying the Mountain Limestone and Millstone Grit of Pen Cerig Calch. Sir R. Murchison once found here a scale of Holoptychius nobilissimus, a very characteristic fish, which seems to corroborate the assumption; and I hope some day in the course of the summer, to be able to examine it more thoroughly than I have yet done. The same beds are, I think, to be found on the opposite side of the valley of the Usk, under the limestone of the Llangattock quarries. At Dura-Den they appear to be one mass of fish remains in the most perfect preservation, and of the most characteristic type. A still higher point of interest lies in the fact that in these upper yellow sandstones, reptilian remains have been found of an organization still higher than even the Telerpeton Elginensis. The Stagonolepis, which was for long considered a fish, has been declared by Professor Huxley to present a very close resemblance in some points to the Crocodilian, and in others to the Lacertian tribes; in fact, it diverges materially from all known and recent forms. This circumstance warns us not to pin our faith too strongly on the limits of animal life, for of late many an example has occurred which has forced us to become more liberal (to use a political phrase) in our determining points, both as to horizons of life, as well as individual features. Before I quit the subject of the Old Red, I must not omit to mention the discovery of the fish bed on the Wall Hills at Ledbury, which has yielded to the praiseworthy researches of two working men, Pteraspis and Ceratiocaris, associated with the Holoptychius, the earliest true Carboniferous fish.

Ascending into the higher beds of the Carboniferous system, I fear not so much has been done; although views have been lately put forth which will ere long change many of the theories of coal vegetation. One of the principal of these views is, that the waters of the Coal Measure age were all salt, and that there were no fresh-water deposits whatever. I may mention here that water has frequently been found at the bottom of deep mines, strongly and thoroughly salt: and after all, the supposition that such fishes as the Cælacanth, the Palæoniscus, and the Amblypterus, belonged to fresh water, or that the Unio or Anthracosia was of fresh or brackish water origin, is very gratuitous, for Palæontologists are much in doubt whether the Uniones, the strongholds of the fresh-water theorists, were not marine inhabitants. The botany of the Coal Measure flora is still dubious on many points, and there are several plants about which the geologico-botanists seem unwilling to pronounce a decided opinion. The great Stigmarian question seems finally set at rest, principally by the labours of my friend, Mr. Binney, of Manchester, but there are others still waiting to be solved, such as the

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true place of the Sigillaria, whether Asterophyllites is an aquatic plant or not, and several other exclusively botanical points, which it would be out of place to enter upon now.

As regards our local work, I have, in company with Mr. Adams, one of the members of the Club, found seven specimens of fish remains, and upwards of fifty shells; and what is of more importance, I have succeeded in tracing a very abundant marine shell bed for nearly sixty miles throughout the coal basin. With Mr. Salter's help in naming and classifying my fossils, some minor discoveries were made, further exemplifying the uselessness of limiting our zones of life too severely—for some 700 feet up in the Coal Measures, a shell was found, hitherto considered to have perished with the end of the Mountain Limestone series.

And now I trust you will not have considered me very tedious in my attempt to review some of the principal points interesting to us as a Society, feeling assured, that though they are not all of local interest, yet they affect us all, for while we individually are local and minute workers, we are, or ought to be, cosmopolitan in geological and scientific knowledge. In bidding you, therefore, farewell as President of Woolhope Club, let me remind you of the somewhat hackneyed but deeply significant proverb:—

"*Ars longa vita brevis.*"

Thanks were then voted to Dr. Bevan, with the expression of the wish that he would allow his address to be printed in the Club's Transactions.

NOTE.

While these sheets were passing through the press, a discovery was made, which, though not actually occurring in the area embraced by the Club, will be of sufficient interest to record; and that is, the observance of a protrusion of Upper Silurian rocks close to Cardiff, in a district hitherto entirely unsuspected, and indeed marked by the Government Surveyors as Old Red Sandstone. My attention was called to the fact by a letter which appeared in the Geologist for April, 1861, and I immediately visited the spot. The deposits occur in the rising ground of Pen-y-lan Hill, about one and a half miles to the east of Cardiff, and are bounded on the west, east, and south by the Drift valley of the Taff, the valley of the Rhymney, and the alluvial marshes on the sea-shore respectively. On the west and south they are covered by Drift, and on the north are overlaid by Old Red Sandstone. The whole area, as far as I have at present made it out, is about one and a half miles in breadth, by one and a half in length. A quarry, the mouth of which faces the Bristol Channel, has been extensively worked. The beds appear to be Wenlock Shale, of which there are also capital sections in the lanes around. They dip to the north east at an angle of thirty degrees. The following fossils have been found—some by Mr. Glass, of Kensington, who first called attention to the facts, and a few by me. Bellerophon dilatatus, Athyris tumida, Illænus, Calymene, Phacops, Acidaspis, Orthoceras, Natica, Rhynconella, &c. I should be very glad if any Hereford member would devote a day to a further examination of these beds with me.

April, 1861. G.P.B.

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THE METEOROLOGY OF THE PAST YEAR, 1858.

Mr. Smith (who had kindly taken charge of the Meteorological department of the Club's observations) laid on the table a number of tabulated statements of the results of his observations, remarking that several interesting phenomena have occurred in the course of the past year.

During the total eclipse of the sun on the 15th of March, 1858, he made observations every five minutes, and communicated the results to Mr. Glaisher, the Secretary of the Meteorological Society, as requested by that gentleman, but the clouded state of the atmosphere prevented them from being so useful as they otherwise might have been. He laid on the table a copy of the collected results as published by the Meteorological Society, and other pamphlets, and then passed to notice the appearance of Donati's comet, remarking that even our elders, generally so loth to acknowledge that anything in these later degenerate days is equal to that in the "good old times," were obliged to confess that this comet equalled, if it did not surpass the comet of 1811. (A laugh).

The high temperature of August, the small amount of rain (only 22 inches) the damp and foggy atmosphere of October, the remarkably low temperature of November, and the mildness of December, were also remarkable features of this year.

The partial eclipse of the moon on February 27th was invisible owing to the clouded state of the sky.

A Meteor was observed by Mr. Lingen in the clear sky at 4 p.m. on December 2nd, the sun shining brightly at the time. It appeared in the N.E., and after moving a short space, leaving a trail of light, it suddenly disappeared. Mr. Smith read a tabulated statement of the appearance of this phenomenon at Brighton and other places, and then passed on to notice that he had been requested by Mr. Glaisher to record seasonable phenomena in the animal and vegetable world. That request having been made public by him (Mr. Smith), he had received from Mr. Woodhouse, of Aymestrey, an obliging communication of the observations which he had made, with a promise to continue them and transmit the results to him from time to time. Last summer the quarterly reports of the Registrar-General previously supplied to Meteorologists gratis were stopped by order of the Government, but the order had been since rescinded through the exertions of Dr. Barker, of Bedford, to whom it was proposed to present a small testimonial of thanks, in the shape of a timepiece, as an acknowledgment of his services to the meteorologists.

Mr. Smith then drew attention to his Returns, remarking that, among other facts, it was noticeable that the Wye was lower in August than had been known for 25 years.

The Barometer for the year was nearly the same as the average for this latitude.

The mean Temperature was 1.4 degrees above the average.

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The degree of Humidity was only 14 thousandths less than the average.

The weight of a cubic foot of air was 7 grains less than the average.

Wind—less N. and S., more of E. and W.

Rain—6 days more than the average; quantity, 1 inch more.

Comparing the results with the average of Hereford from 1846 to 1849, it resulted that the Barometer and mean Temperature were higher in 1858; there have been 10 days more of Rain, but 13 inches less in quantity. S. and W. Winds have prevailed over N. and E. in the ratio of 3 to 2 nearly. Rather less than half of the days in the year were overcast; one-fourth were fair, and the remaining fourth variable.

February was last year the coldest month, and June the hottest, although in general January 9th is the coldest day, and July 30th the hottest. The heat of August last exceeded the average by only one-tenth of a degree. January and December were the dampest months, and June the dryest; during the last quarter of the year there was more moisture in the air than in the other three quarters.

Thanks were voted, amid applause, to Mr. Smith, and it was agreed that his Report should be printed in the Transactions.

METEOROLOGICAL REPORT FOR 1858.

By J. E. Smith.

All the instruments of the Society are in good order and preservation. To those already in our possession, the following have been added:—

1. A Black-bulb Maximum Thermometer.
2. Minimum Spirit Thermometer, for terrestrial radiation on the grass.
3. Lind's *Anemometer* for ascertaining the force of the wind.
4. Dr. Moffat's *Ozone* papers, and wooden box for suspending them.

I have also had a River Gauge painted on the wall of the Infirmary lawn, to show the rise of the Wye at periods of flood; and a Weathercock fixed on the top of the building.

The Record of Observations has been kept with tolerable regularity throughout the year, and the monthly summaries, with the deductions from them, accompany this report.

Several interesting Meteorological phenomena have occurred during the past year.

A Total Eclipse of the Sun happened on the 15th of March, and in compliance with a request from the Meteorological Society, which I lay before you, I made observations every five minutes during the eclipse, and sent the results to the Secretary, Mr. Glaisher. The clouded state of the atmosphere, both here

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and at most other stations, prevented these observations from being so useful as they otherwise might have been. The collected results of observers at various stations have been published by the Meteorological Society, and a copy forwarded me by the Secretary, which I lay before you. The pamphlet contains much useful information, and some that may be interesting. I will merely read the concluding general remarks of the Secretary, Mr. Glaisher, and my own observations made at the time. "At 9h. the sky was overcast, principally with cirrhus; occasional glimpses of blue sky. At 11h. the sky still overcast; clouds more dense; wind sinking. At 12 noon, the clouds very thick; a slight darkness was to be perceived; birds were singing cheerily. At 12h. 15m. the air still duskier; birds were chirping, but less than before, and getting out of sight; blackbird began to sing as at evening; wind rising. At 12h. 30m. very dusky; clouds to south of a ruddy tinge; blackbird singing as before, but sparrows disappeared; the clouds very thick, and in riven shapeless masses, in layers towards the horizon; wind rising; small rain. At 12h. 45m. the clouds rather breaking, but very low; the sun visible for about 5' at the middle of the eclipse (about 1 p.m.); the glimpse of sky thus afforded was of a bright light blue; the clouds continued to break up; light rain. At 9h. the crocus was open; at 11h. half open; at 12h. 30m. nearly closed; at 12h. 45m. quite closed. 1 p.m., from this time the clouds gradually cleared, allowing frequent glimpses of the sun, when a dark spot was observed on its face through the blackened glass."

I have received another pamphlet from Mr. Glaisher, on the mean temperature of every day in the year, as deduced from "Daily Observations taken at Greenwich, during forty-three years, from 1814 to the end of 1856," of which I have made some use in my own deductions.

Donati's Comet was decidedly the great Meteorological feature of the year 1858. Few of us ever saw so glorious and wonderful an object, night after night lighting up its marvellous transparency in the western sky, as it were a flaming sword to protect the gardens of the Hesperides; and when Arcturus shone through it like a brilliant diamond in the hilt of that sword, it certainly surpassed in beauty and grandeur all that I had ever witnessed before; and even our elders, generally so loth to acknowledge that anything in these later degenerate days is equal to what was in the good old times, were obliged to confess that this equalled, if it did not surpass, the Comet of 1811. I have no remarks to make on this subject in addition to what have already appeared in the local journals.

The high temperature of August, the small amount of rain fallen, the damp and foggy atmosphere of October, the remarkably low temperature of November, and the mildness of December, are also remarkable features of the year.

A partial Eclipse of the Moon happened on the 27th of February, but was invisible from the clouded state of the sky.

On December 2nd, as Mr. Lingen was passing through the Vale of Wye, he observed a meteor in the clear sky at 4 p.m., the sun shining brightly all the time. It appeared in the N.N.E., and after moving a short space, leaving a trail behind,

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it suddenly disappeared. An account of this phenomenon having been published in *The Times* newspaper, elicited letters from observers in various parts of the country, who saw the same meteor. I have reduced and tabulated their observations, and forwarded them to Mr. Glaisher; a copy of the same is attached to this report.

METEOR SEEN AT FOUR P.M., DECEMBER 2ND, 1858.

Station.	Altitude at instant of disappearance.	Direction at instant of disappearance.	Direction of motion at instant of disappearance.	Remarks.
Brighton	70°	N.W. by N.	Towards N. E. obliquely down from zenith.	Trail 8° long, only seen just at disappearance.
Hereford	45°	N.N.E.	Towards N.E.	
Derby	20° to 30°	S. by E.	From N.W. to S.E. first ascending, then descending in an arc.	Trail of bright sparks. Larger than star of first magnitude. Blue colour.
Alford, Lincolnshire.	About 40°	S.W.	Perpendicular, started at about 45° and descended 5°	Started from thin belt of clouds, and disappeared in clear sky.

In the month of June I received a communication from Mr. Glaisher, requesting me to record all observations of seasonal phenomena respecting the changes in the animal and vegetable world, such as the period of leafing and flowering of trees, the migrations of birds, the state of the crops, &c. This letter was published in the local papers, and I soon after received from Mr. Woodhouse, of Aymestry, a very obliging communication of the observations he had made for several years past on this subject. He also kindly promised to continue his observations and send them to me from time to time.

Last summer the Quarterly Reports of the Registrar General usually supplied to us gratis, were stopped by order of the Government. Dr. Barker, of Bedford, took up the case on behalf of the Meteorologists, and after extensive correspondence, much trouble and expense, he succeeded in obtaining for us a continuation of the supply of their Reports, which have since been regularly forwarded. It has been proposed to present Dr. Barker with a small testimonial, in the shape of a timepiece, as an acknowledgment of his exertions on our behalf, the subscription to be limited to five shillings; the greater number of observers have already paid their subscription, and a proposition respecting this matter will be laid before you to-day.

J. E. SMITH,
Meteorological Observer.

HEREFORD INFIRMARY,
January, 1859.

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1858.	Barometer.			Thermometers.						Hygrometer.		Wind.						Rain.		Weather.		
	Mean.	Highest	Lowest.	Mean	Highest.	Lowest.	Highest in Sun.	Lowest on grass	Mean of lowest.	Degree of humidity. 1000—saturation.	Weight of a cubic foot of Air.	N.	E.	S.	W.	Average amount of Ozone Dr. Moffatt's.	Average amount of Cloud 10—overcast.	No. of days	Quantity collected.	Days fair.	Days overcast.	Days variable
	in.	in.	in.	°	°	°	°	°	°		gr.								in.			
January .	30.060	30.461	29.500	39.7	56.1	22.0	74.0		32.6	899	552.	6	7	8	10		6.3	8	.31	8	9	14
February	29.757	30.155	29.235	37.7	54.8	21.8	74.5		31.8	827	549.5	6	12	4	6		6.8	7	1.17	10	12	6
March ...	29.699	30.339	28.819	44.6	70.0	23.4	95.5		34.5	773	541.1	9	5	6	11		6.	10	.24	10	15	6
Quarter	29.838	30.461	28.819	40.7	70.0	21.8	95.5		32.9	833	547.5	22	26	20	29		6.4	25	1.72	28	36	26
April.....	29.685	30.133	28.888	50.7	77.3	25.5	94.6		38.6	740	532.8	4	13	6	7		6.4	13	4.39	9	16	5
May	29.670	30.244	28.854	54.8	77.8	33.4	100.0		42.4	750	535.6	3	8	8	12		6.8	14	1.64	9	16	6
June	29.818	30.156	29.571	63.5	84.8	41.1	102.0		51.8	718	516.3	2	2	11	15		6.	6	1.53	11	10	9
Quarter	29.724	30.244	28.854	56.3	84.8	25.5	102.0		44.3	736	528.2	9	23	25	34		6.4	33	7.56	29	42	20
July	29.709	30.000	29.189	62.8	80.8	39.2	100.1		48.6	749	518.4	5	2	7	17		7.	17	2.11	10	14	7
August ..	29.762	30.187	29.467	64.8	86.8	41.1	102.0		48.8	740	517.7	6	3	11	11		6.4	14	2.56	12	12	7
September	29.794	30.263	29.296	61.9	82.6	39.7	104.5		51.3	835	517.5	2	4	12	12		7.5	14	2.14	4	12	14
Quarter	29.755	30.263	29.189	63.2	86.8	39.2	104.5		49.6	775	517.9	13	9	30	40		6.9	45	6.81	26	38	28
October ..	29.778	30.399	29.092	52.8	69.8	31.8	88.6		43.5	788	531.5	7	6	9	9		7.1	12	3.04	8	17	6
November	29.682	30.271	28.771	40.	57.1	14.0	75.8	13.4	31.8	866	544.5	8	12	3	7	1.0	6.8	8	1.19	7	11	12
December	29.715	30.093	28.946	42.4	57.2	28.1	75.4	25.6	36.8	898	544.	1	11	8	11	3.1	7.7	20	1.72	3	16	12
Quarter	29.725	30.399	28.771	45.1	69.8	14.0	88.6	13.4	37.4	851	540.0	16	29	20	27	2.1	7.2	40	5.95	18	44	31
Year	29.761	30.461	28.771	51.3	86.8	14.0	104.5	13.4	41.1	799	533.4	59	87	95	128	2.1	6.7	143	22.04	101	160	104

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WEATHER, &c.

THUNDERSTORMS OCCURRED.—April 16th, May 13th, June on 4 days, July 3 days, August 3 days, September 2 days, December 18th, and at several places round.

THUNDER OR LIGHTNING.—May, June 5 days, July 17th, August 30th, September 5th and 17th.

LUNAR HALOS.—August 22nd, November 17th, and several other days.

SNOW FELL.—February 4 days, April 3 days=7 days.

REMARKABLE RAIN.—January 30th and 31st, March 21st, April 7th and 16th, June 3rd, July 16th and 25th, September 22nd, December 18th, 21st, 22nd, and 23rd, with high winds.

HOAR FROST.—January 10 days, February 5 days, March 4 days, April 3 days, November 8 days.

FOG PREVALENT.—January 4 days, February 4 days, September 2 days, October 11 days, November 9 days, December 7 days. MORNING OR EVENING—March 3 days, April 7 days, June 2 days, August 2 days.

SHOOTING STARS.—January 4th, September, several nights; October 1st, 8th, and 30th, November 6th, 7th, and 11th (none 12th, and on 13th and 14th too cloudy).

METEORS.—*Zodiacal light* several evenings in January; a large meteor at 4 P.M.; December 2nd, at Woolhope, by Mr. LINGEN; and at several other places in the County.

AURORA BOREALIS.—March 12th and 13th; October 8th.

WYE ROSE.—January 9th and 30th: March 14th; April 8th; June 17th; September several times; December 1st, 4 ft.; 19th, 5 ft.; 25th, 6 ft. Very low in February; lower in August than had been known for 25 years.

VEGETATION.—Leaf—earlier shrubs in March; trees in April; *Pyrus Japonica* in flower February, March, and April; Flower—ornamental trees in June: change colour—most trees in October; fall of leaf—most trees in November.

Martin, cuckoo, and wheatear about April 18th.

Cuckoo not heard after June.

Martins, &c., depart in September.

GENERAL CONCLUSIONS FROM THE FOREGOING TABLES.

In comparing the results of this year with the average of the same parallel of latitude, viz., between latitude 52° and 53° N., we find that for Hereford

The barometer is nearly the same as that average.

The mean temperature is 1.4° above the average.

The degree of humidity (1000 saturation) is 799, only 14 less than the average.

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The weight of a cubic foot of air is 533 grains, being 9 grains less than the average.

WIND.—Less amount of N. and S., greater of E. and W.

RAIN.—No. of days—6 days more than the average—1 inch more.

In comparing the same with the average of 4 years (1846 to 1849) taken at Hereford.

The barometer and mean temperature are higher.

Of rain there have been 10 days more and 13 in. less.

South and West winds have prevailed over North and East, in the ratio of 3 to 2 nearly.

The fair days, or those with nearly cloudless sky, and therefore sunny, are about equal to the variable ones, and the overcast exceed them by about 60 days, so that rather less than half the year consists of overcast days, and of the remainder one half are fair and the other, or rather more than 3 months, are variable.

The following Table shows the mean temperature of each month at Hereford, and Greenwich Observatory, for the year 1858, and the same at the latter place as deduced from daily observations of 43 years, from 1814 to 1856.

Month.	1858. As corrected by MR. GLAISHER.		Average of 43 years.
	Hereford.	Greenwich.	Greenwich.
	°	°	°
JANUARY	38.8	37.5	36.6
FEBRUARY ...	37.0	34.6	38.6
MARCH	42.9	41.4	41.4
APRIL	47.8	46.2	46.2
MAY	52.2	51.7	53.0
JUNE	63.0	64.9	59.0
JULY	59.8	60.6	61.8
AUGUST	61.2	62.0	61.1
SEPTEMBER. ---	59.4	60.3	56.5
OCTOBER	50.		49.9
NOVEMBER ...	39.1		43.2
DECEMBER ...	42.2		39.3

From this we observe that in 1858 February was the coldest, and June the hottest month, though in general January (9th) is the coldest, and July (30th) the hottest. The temperature at Hereford was above the average in all the months except February, May, July, and November. The first five months of the year were warmer at Hereford than at Greenwich. That August, though very hot on some days, exceeded the average by only one-tenth of a degree.

WITH RESPECT TO THE SEVERAL MONTHS.

THE BAROMETER.—Was highest (30.461 in.) in January, and lowest (28.771 in.) in November. The highest mean was in January, and the lowest in May. Every month in the year it has risen above 30 inches, and has gone below 29 inches only 5 months.

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THE THERMOMETER.—*Mean temperature* increased from February to August, being higher in January than February. From August it decreased to November, and was again higher in December than it had been in January or February. The mean temperature of April was not quite 1° below, and that of October just 1½° above the average of the year, 51.3°.

MOISTURE.—January and December were the dampest months, and June the dryest by a great excess. During the last quarter there was more moisture in the air than during the other three. The weight of the atmosphere was greatest in January, and least in June, from which month to September it varied but slightly.

CLOUD.—The average amount of cloud was greatest in December, least in March and June, so that these last were the sunniest months; but the greatest number of overcast cloudy days was in October, 17 days, and the smallest number, 9, in January, and 10 in June. The greatest number of fair sunny days was 12 in August, and the smallest 3 in December, and 4 in September. In every month the overcast days exceeded the fair, except in June, when there was one more of the latter, and in August they were equal. The variable days, or those on which sunshine and cloud were tolerably balanced were generally about the same as the fair days, occasionally exceeding them, at other times being less by a few days. In the first two quarters the variable days were less, in the last two, more than the fair ones.

WIND.—Westerly prevailed above all others in every quarter; next to these the Southerly winds, though these were surpassed by the Easterly in the first and last quarters. North and East winds prevailed in November, and were fewest in June. The wind's force on December 23rd was about 15 lb. to the square foot.

RAIN.—The greatest number of days rain fell was in December (20); the smallest was in June (6). The greatest amount fell in April, 4.39 inches; next to that in October, 3.04 inches. The least was in March, ¼ inch, and in January not quite ½ inch. In the first quarter only 1.72 inches fell.

OZONE.—Only recorded the last two months. In November it was present 24 days, in December 29 days, and generally was most plentiful during Westerly winds.

The sum of £1 4s. was voted towards the Barker testimonial.

The Field Meetings were fixed as follows:—Church Stretton, Tuesday, May 31st; Longhope, Tuesday, July 19th; Usk, Monday, August 22nd.

Thanks having been voted to the Chairman, the meeting broke up.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, TUESDAY, MAY 31ST, 1859.

CHURCH STRETTON.

The record of this meeting cannot be found in the local newspapers. From the minutes of the Club we find that the following were present. Dr. G. P. Bevan (President), Messrs. Cam, Hutchinson, La Touche, Lingwood, Salwey, Smith, and Thompson.

A letter was read from Colonel Colvin, announcing that he was unable to accept the office of President.

It was resolved that three Vice-Presidents be elected annually, to be selected from their acquaintance with the localities fixed for the Field Meetings, whose duties would consist in their acting as Guides and Directors of each separate meeting.

Mr. Cam was requested to interview the Council of the Herefordshire Philosophical Institution as to the possibility of making an arrangement as to obtaining a space in their Museum for the collection of the Woolhope Club, and to report at the next meeting.

It was announced that, on the invitation of the Malvern Club, there would be a joint meeting of the Field Clubs at Ledbury on Friday, July 29th.*

The ground covered by the members extended from Church Stretton through the parishes of Coddington and Gretton to Caer Caradoc. The Rev. J. H. Barker and Mr. T. Curley joined the party at dinner, and Mr. James Davies and Mr. Morgan attended as visitors.

* Afterwards altered to Wednesday, June 29th

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Woolhope Naturalists' Field Club.

JOINT MEETING WITH THE COTTESWOLD AND MALVERN FIELD CLUBS AT LEDBURY, WEDNESDAY, JUNE 29TH, 1859.

Having failed to find a record in our local papers or in the minutes of the Club of the above Joint Field Meeting, we learn from page 19 of Transactions of the Malvern Club, Part III.* that an examination was made of the railway cutting at Ledbury railway station, and of the fossils collected by Henry Brooks, a working man of Ledbury, consisting of numerous remains of the fossil fishes, Auchenaspis, Cephalaspis, Pteraspis, and Plectrodus, from rocks at the base of the Old Red Sandstone, termed "Passage-beds" by Sir Roderic Murchison, but which lie considerably above the Downton Sandstones and Upper Ludlows.

"It was soon after this meeting that Mr. Walter Barrow obtained a nearly perfect specimen of *Cephalaspis Murchisoni* from the *Auchenaspis* bearing grey grits above the Downton beds . . . "

A short account of the meeting will also be found on pages 52 and 53 of the Worcestershire Naturalists' Club, in which we read that the company were led by Rev. Wm. Symonds to the deep railway cutting through "Dog Hill," where the Passage-beds between the Old Red and the Upper Silurian formations are exposed to view, and the Old Red Sandstone, with its intervening beds of marl and grey shales, appear in a singularly disturbed manner, its strata tilted up very strangely, and presenting various tints.

Mr. Symonds alluded to the position of the so-called Cornstone beds in the Old Red, and contended that some of them, instead of being at the base of the system, as laid down by Sir R. Murchison, ... in fact occurred in various places of the system.

Braidlow Hill was also visited, and the botanical members botanized in Frith Wood.

The clearness of the atmosphere rendered the view of the distant heights of Monmouth, Brecon, and Radnor very impressive.

The proposed Second Field Meeting of this year for Longhope, on Tuesday, July 19th, did not come off, in consequence of the members not having received due notice thereof. A special bye-day was appointed for Mordiford on Thursday, September 8th.

* The first 37 pages of Part III. comprise "A Sketch of the Proceedings of the Malvern Naturalists' Field Club from its commencement in 1853 to the close of the year 1868," by the Rev. Wm. S. Symonds, F.G.S., Rector of Pendock, and President of the Club.

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Woolhope Naturalist's Field Club.

SECOND FIELD MEETING, MONDAY, AUGUST 22ND, 1859.

USK.

This Club had one of their most agreeable Field Days on Monday, August 22nd, in the neighbourhood of Usk. Having reached the station of Little Mill by rail, they proceeded, under the guidance of their indefatigable President, Dr. Bevan, on foot through the isolated districts of Silurian rocks, that have been elevated above the Old Red Sandstone, in the neighbourhood of the town of Usk. Here they examined several interesting sections and quarries of Ludlow and Wenlock rocks, and carried off many of the characteristic fossils.

The country in its general appearance very much resembles the valley of Woolhope, but the hills have not been raised to so great an elevation, nor have the lower strata been brought into view.

Having enjoyed a most rural lunch at the wayside inn at Prescoed, the little party of eight or nine reached the "Three Salmons" at Usk in high spirits and with capital appetites, which however were soon satisfied at the plentiful table of their host, Mr. Dowell, of that hostelry.

The Club intend having another Field Day before the season is over, when they expect every member to do his duty by attending at the appointed time and place, which will be duly announced.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, THURSDAY, SEPTEMBER 8TH, 1859.

MORDIFORD.

On Thursday, September 8th, this Club held a meeting, the last probably for the present season. At 9 a.m. the members met at breakfast at the City Arms Hotel, in this city, under the presidency of Dr. Bevan, of Beaufort, besides whom there were present :—the Rev. J. F. Crouch, Rev. J. Miller, Rev. J. D. La Touche, Mr. C. Bodenham, Col. Colvin, Mr. R. M. Lingwood, Mr. R. Lightbody, Mr. T. Cam, Dr. Bull, Mr. E. Y. Steele, Mr. J. E. Smith, Mr. Flavell Edmunds, Mr. Baylis, and Mr. A. Thompson, Assistant Hon. Secretary.

After the transaction of the business, the members started for a visit to Mordiford, and the neighbouring valley of elevation, which had been rendered classic ground to the geological student by the labours of Murchison, Lewis, and others. The day was fine, and the members spent some hours pleasantly in the Checkley Valley, and at the various quarries in the vicinity. At 4 p.m. they returned to the City Arms and partook of an excellent dinner together.

At this meeting a letter was received from Mr. Suter, notifying his resignation of the office of Honorary Secretary of the Club.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING,

FEBRUARY 28TH, 1860.

The Eighth Annual Meeting was held at the Green Dragon Hotel, Hereford, on Tuesday, February 28th.

A letter was read from the President (Dr. Bevan), apologising for not being able to attend on account of the serious illness of his wife.

Mr. R. M. Lingwood, Vice-President, was voted to the Chair. There were present :—Revds. J. F. Crouch, T. Hutchinson, T. H. Lee Warner, Thomas West, Dr. Bull, Mr. Thomas Cam, and Mr. Arthur Thompson.

The Accounts showed a balance of £43 15s. 9d.

Notice was given of the resignation of Mr. John H. Griffiths and Mr. Wm. Stubbs.

ALTERATION OF RULES.—Rule 2. The Club was to consist of 50 Members, with Honorary Members, President, three Vice-Presidents, and other Officers elected at the Annual Meeting in the early part of the year. Rule 3. Fourteen days' notice of the Field Meetings to be given to the Members. Amongst other alterations, Rule 13 was inserted, by which the Assistant Secretary was to send out circulars one month before the Annual Meeting to all defaulters, calling their particular attention to Rule 12.

Mr. J. E. Smith having resigned the office of House Surgeon at the Infirmary, the Meteorological Observations were continued by Mr. Glegg Bullock.

Rev. W. H. Purchas was elected an Honorary Member of the Club.

Mr. R. W. Banks of Ridgebourne House, Kington, was requested to fill the office of President for 1860. Mr. R. M. Lingwood, Rev. J. F. Crouch, and Rev. T. H. Lee Warner were elected Vice-Presidents ; Rev. J. F. Crouch, Honorary Secretary ; Mr. Arthur Thompson, Treasurer and Assistant Secretary.

A Committee for the publication of The Flora of Herefordshire, by Rev. W. H. Purchas, was appointed as follows :—Dr. Bull, Rev. J. F Crouch, Mr. Flavell Edmunds, Rev. Thos. H. Lee Warner, and Mr. R. M. Lingwood.

The following days were fixed for the Field Meetings of the present year :—

TUESDAY, JUNE 5th—LYSTON.
" JULY 3rd*—YAZOR.
" AUGUST 7th—PRESTEIGN.

* Afterwards altered to July 24th, to meet the Warwickshire and Oswestry Field Clubs at Ludlow.

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Woolhope Naturalists' Field Club.

JOINT MEETING WITH THE MALVERN AND THE WORCESTERSHIRE NATURALISTS' CLUBS.

EASTNOR, DOG HILL, AND LEDBURY.

TUESDAY, MAY 15TH, 1860.

In the minutes of our Club there is no record of this Meeting. It is, however, recorded in the Transactions of the Worcestershire Naturalists' Club, from which we read that the united party proceeded to the line of the Hereford railway, where a shaft was being sunk in the Silurian rocks. Mr. S. Ballard, the Engineer of the line, explained its course.

Thence the route was taken to the open cutting at the mouth of the tunnel near Dog Hill, Ledbury, where Rev. W. S. Symonds delivered an extempore discourse upon the order of succession of the "Passage-Beds," between the Silurian strata and the Old Red system here exposed to view in a very picturesque manner, as also upon the curious bucklered fishes contained in some of them, especially adverting to the curious forms of Auchenaspis, Plectrodus, Cephalaspis, and Pteraspis, all now extinct. It was important to observe that there was no sudden breaking off, but a gradual retrocession of strata from the Ludlow rocks into the Old Red.

In his sketch of the Proceedings of the Malvern Field Club from 1853 to the close of 1868 (see Transactions of the Malvern Naturalists' Field Club, Part III.), on page 21, referring to the year 1860, the Rev. W. Symonds writes: "The principal Field investigation of this year consisted in various explorations and examinations of the Malvern tunnel near the Wells. On several occasions many of the members joined in the arduous undertakings, which were carried out by Mr. Alan Lambert and myself, of taking sections of the Malvern and Ledbury tunnels, amid darkness, dirt, wet, and smoke. The results of these explorations is fortunately recorded elsewhere, for probably many years will pass before human eyes will again rest upon the vast masses of greenstone, the great veins of red syenite, and the fissures filled with old Silurian muds and shales containing fossils, which are entombed in the bosom of the Hills (see "Quart. Journ. Geol. Soc.," p. 113, May, 1861, and "Siluria," 4th edition, p. 94).

Another important discovery was the detection of several bones of the *Bos primigenius*, *Rhinoceros*, and *Mammoth*, found by Mr. Ballard's workmen in the till and angular drifts which rest against the flanks of the Malverns. Other specimens obtained by Mr. Walter Burrow were found in the excavations made

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for the cellars of the Railway Hotel. Like those found near the mouth of the tunnel, they were imbedded in a mass of red stiff clay full of large angular boulders, most of them of local origin.

Later study of these *Angular* drifts containing Mammalian remains induces me to believe that they are for the most part *atmospheric*, and owe their origin to that latter portion of the Glacial epoch which is termed *Post-glacial*, but when the cold was very intense during the autumn and winter months, and ice and snow enveloped every hill and dale, while at the same time the long-haired elephant and rhinoceros were the inhabitants of the Malverns and the Cotteswolds, and the ancient vales of the Severn, Avon, Wye, and Usk.

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Woolhope Naturalists' Field Club.

FIELD MEETING, TUESDAY, JUNE 5TH, 1860.

LYSTON HOUSE.

On Tuesday, June 5th, the Members of this Club held their first Field Meeting for the season, on which occasion, under the Presidency of Mr. R. M. Banks, fourteen Members and seven Visitors met at breakfast at Lyston House, pursuant to invitation from Mr. R. M. Lingwood.

The meeting fixed for July 3rd at Yazor was altered to July 24th, to meet the Warwickshire and Oswestry Field Clubs at Ludlow.

Rev. R. Dixon was elected a Member of the Club.

After a pleasant exploration of the neighbourhood, the members returned in the evening to Hereford and dined together at the Mitre Hotel, when three other Members joined the party. The Very Rev. the Dean of Hereford, and Mr. J. F. Symonds and James Davies came to the dinner as visitors.

After dinner a short address was delivered by Rev. W. S. Symonds on "The Old Red Sandstone," and Captain Guise of Elmore Court, Gloucester, President of the Cotteswold Naturalists' Field Club, gave an address on "Flint Instruments found in the Gravel Drifts of France." Capt. Guise was elected an Honorary Member of this Club.

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Woolhope Naturalists' Field Club.

MEETING, JULY 24TH, 1860.

LUDLOW FOR DOWNTON AND LEINTWARDINE.

The second Meeting of the present year took place at Ludlow on Tuesday, the 24th July. Mr. R. W. Banks presided. Mr. Sparrow and Mr. Wyles, Members of the Warwickshire Naturalists' Field Club, were in this party (thirteen Members and six Visitors). The party were conveyed from Ludlow to Downton Castle Inn, where the botanists and geologists separated to follow their researches through the Downton Castle grounds in the localities which were most favourable to their pursuits.

The geologists, under the able guidance of Mr. Lightbody, after examining a section of the Old Red on the left bank of the Teme, crossed the river at Forge Bridge, and walked down the river for a short distance as far as Tin Mills, to examine the Passage-Beds from the Ludlow Rocks into the Old Red.

On the road a quarry of the Downton Sandstone was examined; the beds dipped at a sharp angle to the S.W. On one of the slabs of building stone recently raised were found numerous portions of the remarkable crustaceans, *Pterygotus* and *Eurypterus*, which form a distinguishing feature of these beds.

Passing onwards, some olive-gray-coloured beds of Shale were examined, which were considered to be identical with the Upper Passage-Beds in the railroad cutting at Ludlow. These beds are on a lower level than the beds of the quarry before mentioned, and appear to graduate upwards into the Red Sandstone, but no opportunity was afforded of ascertaining on what beds they repose.

Their relative position to the Downton Sandstone here can only be reconciled by the supposition of the occurrence of a fault and the upheaval of the Downton beds, which were ascertained to lie conformably on the Upper Ludlow Rocks.

The course of the party now was up the river through the beautiful and richly wooded gorge of the Teme; the picturesque rocks on either side of the river, in many places almost white from a calcareous deposit, afforded excellent sections of the Upper Ludlow rocks.

Polypodium dryopteris, the Lady Fern, *Polystichum* and *Cystopteris fragilis*, were noticed as occurring in great abundance.

Near the Bow Bridge, on the left bank of the river, a fine escarpment of Aymestrey Limestone was passed. Here the party again united, and left in crowded carriages for Leintwardine.

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At Trippleton a quarry of Lower Ludlow was examined, and a fine specimen of the shrimp-like Crustacean, *Ceratiocaris*, was discovered.

Near Leintwardine the Lower Ludlow beds again appeared on the sides of the lane leading to Church Hill, and numerous Graptolites and other characteristic fossils were found in them.

At Church Hill, famous for having furnished so many new species of Star-fishes (several of which have been described by Mr. Salter in the "Annals of Natural History") and Crustaceans, the day's excursion terminated, and the party returned to Ludlow, where they dined at the Feathers Inn.

The Club was honoured with the presence throughout the day of Dr. H. B. Geinitz, Professor of Geology and Mineralogy in the University of Dresden, whose able researches in the Permian and Lower Silurian beds of Saxony are so often mentioned by Sir Roderick Murchison in "Siluria." He was elected an Honorary Member of the Club. At this Meeting Mr. Henry Jenkins of Madley was elected a Member.

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Woolhope Naturalists' Field Club.

FIELD MEETING, TUESDAY, AUGUST 7TH, 1860.

PRESTEIGN.

This Club held their last Field Meeting for the year at Presteign, on Tuesday, the 7th August.

The Members under Mr. R. W. Banks, President, assembled at Corton Turnpike, and after passing the quarry of Upper Llandovery, or May Hill Sandstone, made their way to the sandpits on the north side of the hill. Here Wenlock Shale and Woolhope Limestone, resting on Upper Llandovery beds, inclining 40 deg. N., appeared cropping out on the surface, evidently upheaved by the same volcanic eruption which altered the adjoining limestone rocks of Nash, and threw up Stanner rocks, Hanter and Old Radnor hills.

On the top of Nash Scar the party halted to admire the view of the Nash and Knill Valley, the plains of Herefordshire, and distant Malvern Hills; while Mr. J. E. Davis and his father, Dr. Davis (who so ably aided Sir R. Murchison when he first explored this district), pointed out the numerous faults which occurred in the broken and wooded ground immediately around.

Evenjobb was next visited, and the party proceeded over Evenjobb Hill, where the quarries afforded good sections of the Lower Ludlow rocks. A small portion of Pterygotus was here discovered. A still more extensive view opened out on Evenjobb hill; the Malverns, Stoke Edith grounds, the Cotteswold range of hills, from Cheltenham down the vale of the Severn, the Black Mountains, and Brecon Beacons, appeared in the distance, while the valley of Old Radnor immediately beneath, and Radnor Forest, added to the beauty of the scene.

Passing by Discoyd, and visiting several Upper Ludlow quarries on the way, the party arrived at Presteign, where a substantial and excellent dinner was provided at the Radnorshire Arms.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING.

THURSDAY, FEBRUARY 7TH, 1861.

The Ninth Annual Meeting of the Club was held at the Green Dragon Hotel, on Thursday, February 7th, at 1-0 p.m. There were present: Mr. R. W. Banks, President, Rev. J. F. Crouch and Rev. R. M. Lingwood, Vice-Presidents. Rev. W. S. Symonds, Honorary Member, Colonel Colvin, Rev. R. Dixon, Rev. T. Hutchinson, Mr. J. E. Smith, Rev. Thos. West, and Mr. Arthur Thompson, Treasurer and Assistant Secretary.

The Accounts showed a balance in the bank on January 31st, 1861, of £81 10s. 1d.

A letter was read from Mr. H. Wheatley, Black Rock, Co. Cork, dated February 1st, 1861, offering, provided the projected Museum was in a sufficient state of forwardness to exhibit them, a cheque for £20 towards procuring and preserving a specimen of each of the fish of Herefordshire—and a further donation if required. As regards the King of Fresh Waters, he desired that a specimen of the fish should be represented soon after being hatched, the samlet of one year old, and the samlet when he has just put on his silvery dress, with the adult salmon of say from 20 to 30 lbs; the rest of the river inhabitants to be represented by a single specimen, the finest procurable.

Mr. Robert Lightbody was elected President for the year. Mr. George Cocking of Ludlow, Mr. R. M. Lingwood, and Mr. Elmes Yelverton Steele of Abergavenny, Vice-Presidents. Rev. J. F. Crouch was re-elected Honorary Secretary, and Mr. Arthur Thompson Treasurer and Assistant Secretary.

The following days and places for Field Meetings for this year were fixed:—

THURSDAY and FRIDAY, 23rd and 24th May—LUDLOW, to meet the Malvern Club.

FRIDAY, 21st JUNE—TARRINGTON.

FRIDAY, 9th AUGUST—ABERGAVENNY.

The retiring President, Mr. R. W. Banks gave an address.

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THE ADDRESS

Of the retiring President, R. W. Banks, Esq., read before the Members of the Woolhope Naturalists' Field Club, at their Annual Meeting, held in Hereford, on Thursday, February 7th, 1861.

Gentlemen,—On retiring from the office of President, it becomes my duty to present to you a summary of the proceedings of the Club during the past year, and to offer such suggestions as will, in my opinion, best promote the objects which it has in view. I enter upon the subject with a feeling of diffidence, as my remarks are founded more on the discoveries and observations of others, than of myself, and I must therefore request your indulgence for any errors into which I may fall, and for the want of anything novel in my address.

The addresses of preceding Presidents have in many respects anticipated the remarks which I might have made, and have somewhat circumscribed the field over which I have to travel. I shall however endeavour, as far as I am able, to avoid a repetition of their views and suggestions, merely calling your attention to them as I proceed.

We must deem it a fortunate circumstance, that during an unusually wet season, we were able to hold our Field Meetings on the days originally fixed, and to enjoy on each of those days, uninterrupted fine weather.

You will all remember the hospitable reception which we met with at Lyston, the residence of one of our Vice-Presidents, Mr. Lingwood, prior to our excursion on the 5th of June. The object of our meeting was to explore that well-defined ridge, known as Saddlebow Hill, which appears to an observer from the northern part of this County, as one of the southern barriers to the valley of the Old Red Sandstone. Mr. Lingwood had discovered a head of Pteraspis Lloydii in the Cornstones of Orcop; there was therefore a reasonable hope that we might on our way find some traces of the Old Red fishes. In this we were disappointed; but, although we failed to find any fossil remains, we obtained an admirable survey of the country. Having ascended the hill from Lyston, we looked down on the well-wooded grounds of Mynde Park, and passing near Orcop, and over Saddlebow Hill, arrived at Garway Hill, the extremity of the range. From its summit a magnificent prospect opened to our view; to the west lay the Skyrrid, and the hills of the Upper division of Old Red, which surround Abergavenny—to the north-west the long range of the Black Mountains, and in the same direction, considerably in advance, the comparatively low range of Cornstone hills which extends from St. Devereux to the Wye at Whitney;—looking to the north, over the wide valley of Old Red, Lady Lift and Dinmore hills appeared—beyond them the Ludlow rocks, represented by Hergest ridge and Bradnor, and, in the extreme distance, Radnor Forest, occasionally hidden by passing showers;—to the east, the well-known features of the Titterstone Clee Hill and Wenlock Edge, and the somewhat tame outline of the Longmynds, the oldest of our fossiliferous rocks, thus affording a view of the whole range of Palæozoic rocks. Turning

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round to the south, Monmouth and Ross lay before us, and the valley of the Wye, flanked by the Coal basin of the Forest of Dean—to the east, the Malvern Hills, with the range which runs along the vale of the Severn, and the more distant Cotteswolds, representatives of the Oolite formation, in the background. It would be difficult, perhaps, to find a spot where a better view can be obtained of the Old Red Sandstones of Herefordshire, which at Pen-y-cader-fawr rise to the height of 2,545 feet,* and which are in this district estimated to be 10,000 feet thick.

I shall not notice the evidences of upheaval and denudation which must have struck every reflecting observer, but will refer you to the address of our late lamented member, The Rev. Thomas T. Lewis, where the subject has been discussed with all that local knowledge and ability which peculiarly distinguished his investigations; and to Mr. Symonds' able paper on the Old Red Sandstone of Herefordshire.† Descending Garway Hill, our road lay through Kentchurch Park, to Kilpeck and St. Devereux, whence the railway conducted us to Hereford. I cannot conclude the notice of this day's proceedings without referring to the pleasure which the members experienced from the presence of Capt. Guise, the President of the Cotteswold Club, whose knowledge on all subjects connected with Natural History, particularly Entomology, is as accurate and methodical as it is various. He has kindly favoured me with a list, which I subjoin, of the Beetles which he met with during the day, by the roadside and on the swampy parts of Garway Hill.

Our second meeting was at Ludlow, on the 24th July. The members proceeded to Downton Castle; our indefatigable member, Mr. Lightbody, undertook to be our guide for this day's excursion. After examining a section of the Old Red on the left bank of the Teme, we crossed at Forge Bridge, and walked down the river for a short distance, as far as Tin Mills, to examine the passage from the Ludlow rocks into the Old Red. On our way, a quarry of the Downton Sandstone, the beds of which dipped at a sharp angle to the south west, was examined. On one of the slabs of building stone, recently raised by the workmen, numerous heads and other portions of Eurypterus pygmœus and Pterygotus Banksii, with parts of the body rings of another species of Pterygotus (probably P. Gigas) were observed. Passing onwards, some olive grey coloured beds of shale were examined by the side of the old watercourse, which were considered by Mr. Lightbody to be identical with the Upper Passage-beds in the railroad cutting at Ludlow. These beds are on a lower level than the Downton beds before referred to, and may probably graduate upwards into the Old Red, but no opportunity was afforded of ascertaining on what beds they repose. Supposing that they are the Upper Passage-beds, their relative position to the Downton beds, which were ascertained to lie here conformably on Upper Ludlow rock, can only be reconciled by the supposition of the occurrence of a fault, which has placed these shales in a position apparently inferior to the Downton beds. Retracing our steps for a

* The more recently published Ordnance Survey Map, Sheet 214, on the scale of 1 inch to 1 mile, gives Pen-y-gader fawr as 2,624 feet high, and Wawn fach (1½ miles further north) as 2,660 feet high. See Transactions, Vol. 1903, p. 147.—EDITOR.

† Edinburgh Philosophical Journal, April, 1859.

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short distance, our course was up the river, through the beautiful and richly-wooded gorge of the Teme—the picturesque rocks on either bank, in many places whitened by a calcareous deposit, affording excellent sections of the Upper Ludlow rock. Near the Bow Bridge a fine perpendicular escarpment of Aymestry limestone was passed ;—here the Botanists, who had separated to pursue their researches in the Downton Castle grounds, rejoined the party. Our course was now directed to Leintwardine. At Trippleton a quarry of Lower Ludlow was examined, and a fine specimen of Ceratiocaris discovered. Near Leintwardine, either side of the lane leading to Church Hill exposed beds of Lower Ludlow, in which numerous Graptolites and other characteristic fossils occurred. At Church Hill, famous for having furnished the Pterygotus punctatus and many new species of Star-fishes (several of which have been described and figured by Mr. Salter), the day's excursion terminated. Here the custodians of the quarry appeared, and offered for sale some fair specimens of Star-fishes, which ere now probably grace the cabinet of Professor Geinitz, of Dresden, our companion during the day, whose able researches in the Permian and Lower Silurian strata of Saxony are so often mentioned by Sir Roderick Murchison in "Siluria." I will not quit the Church Hill quarry without expressing a wish that the Club will use its influence to persuade the owner of the land in which the quarry is situate, to allow the working of it to be continued within fixed and reasonable limits, and thus enable our enterprising members to continue their researches, which have already thrown so much light and additional information on the forms of extinct Star-fishes and Crustaceans.

Before I pass to our next day's excursion, I must again refer you to Mr. Lewis' Address for an account of previous meetings of this Club at Leintwardine and the Nash Lime Rocks, which the Club again visited on the last Field-day of the past year.

We met at Corton Turnpike on the 7th August, and after passing the quarry of Upper Llandovery, or Mayhill Sandstone, here worked for road materials, we ascended the hill and passed round to the sand-pits on the northern side. Here Wenlock Shale and Woolhope Limestone, resting on Upper Llandovery beds, dipping 40 degrees to the north, appeared cropping out on the surface—the anticlinal beds of which are seen on the southern side, affording, in the Upper Llandovery beds, specimens of Petraia and other characteristic fossils. Sir Roderick Murchison, in his "Silurian System," expresses an opinion that the same volcanic forces which disturbed the strata on Old Radnor Hill and threw up the volcanic masses of Stanner Rocks, Worzel and Hanter Hills, had also exercised a powerful operation here, upheaving the limestone and Llandovery beds—altering the limestone of Nash into an amorphous, unstratified rock, and causing the numerous faults in the Old Red Sandstone, which occur in the immediate vicinity, although the igneous rocks did not present themselves to his view ; subsequent investigations have confirmed the correctness of his opinion. At Old Radnor the igneous matter has burst through the limestones, altering in a similar manner the portions which came immediately into contact with it, and converting the Wenlock Shale, with the Trilobites and Encrinites which it contains, into a fractured coal-like shale.

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We shall add fresh interest to the subject, if we can ascertain the period when this outburst took place; we know that these Syenitic or hypersthenic rocks are supposed to have been formed under water, when the whole district was submerged. The searcher for fossils in the Upper Ludlow rock in the immediate neighbourhood of Kington will be struck by the fact that he cannot find the Orthoceratites and larger Mollusca in the same symmetrical state as in the neighbourhood of Ludlow; at Kington they are generally flattened, compressed, or broken; now this flattening, or compression, is attributable to either direct or oblique pressure on the mould or cavity which the shell itself once occupied, before the cast, which we now find, was perfectly formed. The outburst of a large igneous mass, upheaving and bending the strata of the adjacent rocks, would account for the pressure which these fossils exhibit. If we continue our search upwards we shall find further evidence of the period of the outburst in the fact that at Ivy Chimney and on other parts of Bradnor Hill, waterworn pebbles of the syenite of Stanner, pieces of partially calcined limestone, and boulders of the red and white quartz (Upper Llandovery Conglomerate) of Old Radnor are met with, imbedded in the Downton sandstone. I think, therefore, it may reasonably be assumed that the outburst took place when the Upper Ludlow rocks were in an unconsolidated state, and while the deposits, which form the Downton sandstone, were taking place. Hoping that you will excuse this digression, I will now return to the subject of the day's excursion. Passing through Can Wood, our party halted on the summit of Nash scar, to admire the view of the Nash and Knill valley, the plain of Herefordshire, and distant Malvern hills, while our Honorary member, Mr. J. E. Davis and his father, Dr. Davis, who first investigated these limestone rocks and their fossil contents, pointed out the numerous faults in the broken and wooded ground around, and the outlying patches of Old Red Sandstone. Proceeding to Evenjobb, we ascended Evenjobb hill, where quarries afforded good sections of the Lower Ludlow rocks. A small portion of Pterygotus was here discovered. Descending the hill, and passing by Discoyd, we reached Presteign, examining on our road several quarries of Upper Ludlow rock. Thus terminated the last excursion of the year.

I am able to record but few geological discoveries during the past year within the district which the Woolhope Club considers to be its own.

The Ludlow Bone-bed, since the publication of the "Silurian System," has been considered to afford the earliest traces of vertebrated animals, but we now know that the Lower Ludlow and Upper Ludlow rocks contain a species of Pteraspis, nearly allied to the Pteraspides of the Downton sandstone, which have been definitely placed among the Fishes by Professor Huxley, on a careful comparison of their structure with that of Cephalaspis.*

Mr. Lightbody, in a letter of some length, has kindly communicated to me the result of his labours; among other discoveries he mentions a new species of Ampyx, and a shell of small size, which Mr. Salter considers to be a new genus allied to Siphonotreta in the Caradoc Shales of the Onny valley; a new species

* Huxley on Cephalaspis and Pteraspis. Quarterly Journal, Geological Society, vol. 14, p. 281.

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of Lingula in the Bala limestone at Hordesley; and a new species of Asaphus found by Mr. Marston in the shales above this limestone. Mr. Lightbody also tells me that Professor Wyville Thompson is writing on a new Echinosphærites, found in Church-Hill quarry, somewhat similar in character, but larger and more spiny than Palæodiscus ferox. I regret that I am unable to refer at greater length to the subject of Mr. Lightbody's letter, but I trust that he will supply my omission by reading a paper at one of our meetings for the present year. Mr. Crouch has met with Pterygotus punctatus, and a species of Ceratiocaris in the Lower Ludlow Shales of Bradnor wood, Kington. Mr. Salter, when he heard of it, rejoiced in the probable discovery of the zone of the Star-fishes, and spent a day during last summer with Mr. Crouch and Mr. Lightbody, in a search for traces of them in these beds without result. As none of the Old Red fishes have been yet met with in the neighbourhood of Kington, I may mention that I found, last summer, in a quarry of grey sandstone, on the Rodd farm, Kington, a good specimen of the head of Cephalaspis Lyellii. I had previously met with slight traces of fishes in the same quarry, but the fragments were too small for reference to any known species. Mr. Alfred Marston, who has done so much to bring to light the extinct animals of the Ludlow district, has kindly furnished me with a list of fossil Crustaceans, Star-fishes, and fishes, found in the neighbourhood of Ludlow, during the last four or five years. I have made additions to the list, and, having submitted it for correction to Mr. Lightbody, have added it to my address, as a record of some of the discoveries of the Woolhope Club.

I have dwelt at some length on these details, because it appears to me that the Field Clubs may more usefully employ themselves in the collection and co-ordination of facts relating to Natural History in all its branches, than in speculations, which, however ingenious, would crumble to pieces when they were handled, on account of the limited range of our researches.

As it is part of my duty to-day to offer suggestions for the promotion of the objects of the Club, I feel I cannot do better than call your attention to the following suggestions of our kind friend, Mr. Salter, in a letter to myself:—"We shall never really know what the true nature of our boundary lines is until people of leisure will note on their maps the facts as they arise. May I beg you, in the name of science, to do this for your district—a yellow colour for Downton—a blue for Ludlow—a brown for Passage-beds, dotted down in the exact spots where they occur, would point to the true arrangement of the faults and anticlinals in a way that no guess work in London could do; then, when such coloured spots increased in number, a visit from any practised field-worker would clear up whole lines of work, and our maps would begin to look like what no other country has done. There is a special reason for doing so on the borders of Siluria and Devonia, since the information is all valuable among Transition beds." I would suggest, in addition, to any members of the Club who may carry out Mr. Salter's suggestions, that they will do the Club a great service if they will bring the maps on which the facts have been so noted to the Field Meetings, in order that their notes may be there compared and criticised, and the result recorded on a map belonging to the Club.

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Notwithstanding all the attention which has of late years been paid to the subject of the Old Red Sandstone of Herefordshire, it still remains an object for our careful investigation. Fresh discoveries are continually throwing a new light on the relations of the Herefordshire beds to those of Scotland. The Lesmahago black flags proved on a comparison of the similar, although varying, species of fossils which at the same time were discovered in the Downton beds, to be the equivalents of the latter,* and are now known† to be overlaid by red shales in which Cephalaspis Lyellii occurs—the relation of the Passage-Beds of the Ludlow railway cutting to the Old Red have recently been elucidated by the able investigations of Mr. Symonds,‡ in the Ledbury tunnel. He traces a gradual succession from the Aymestry limestone through the Upper Ludlow and the Downton Sandstone, which has there scarcely a representative, to the equivalents of the Ludlow Passage-beds, identified by the occurrence in them of Auchenaspis and Pterygotus Ludensis, and he finds that these beds pass upwards into a series of red marls, with yellowish, grey, and pink, sandstones, containing Pteraspis and Cephalaspis.

At Trimpley, near Bewdley, Mr. Roberts has found in the Cornstones Cephalaspis Lyellii and Pteraspis Lloydii, and in the immediately underlying Grits, Pteraspis Banksii, Pterygotus Ludensis, and Parka decipiens. When we add to these facts the occurrence of Cephalaspis Lyellii and Pteraspides in the Cornstones of Leysters, and numerous other parts of Herefordshire, and the discovery of Eurypterus Symondsii in the Cornstones of Rowlstone, we cannot doubt that we have in Herefordshire the equivalents of the Perthshire and Forfarshire§ beds, in which Cephalaspis Lyellii, Pterygotus Anglicus, and Stylonurus are associated. These beds have been styled by Sir Roderick Murchison as the Lower Old Red.¶

I am not aware that we have any trace of the middle division (or Caithness flags) characterised by Pterichthys oblongus, Cocosteus, Dipterus, Diplopterus, and other fishes. Very recently, the Rev. Hugh Mitchell has discovered one of these fishes, Dipterus, associated with Cephalaspis Lyellii, in the Lower Old Red of Forfarshire.‖ Here then is a subject for our researches; fresh discoveries are continually made, and there is no reason why we may not, in the Woolhope district, find some remains of fishes, which may either establish, or negative, the existence of this threefold division of the Old Red. We have some traces of the

* Murchison's "Lesmahago Silurians," Quarterly Journal, Geological Society, vol. 12, p. 15. Salter's "Himantopterus," ibid, p. 26. Banks' "Tilestones of Kington," ibid, p. 93. Mr. D. Page, F.G S., remarks that this last paper "might as well have been written for the Tilestones of Forfar as for the Tilestones of Kington, so entirely similar are they in all their organic remains."

† Geikie's "Old Red Sandstones," Quarterly Journal, Geological Society, vol. 16, p. 214.

‡ Symonds' "On Passage Beds at Ledbury," ibid, p. 193.

§ Mr. Page informs me that the grey fissile flagstones and tilestones of Forfar "our lowest Old Red," contain among other fossils, Lepidodendroid stems, Fucoids, and Zooterites, fern-like fragments (Sphenopterys?), Pterygoti of several species, from 1ft. to 6ft. long; Eurypteri, two species; Acanthodes Diplacanthus, two species; Climatius, several; Plectrodus, Icthyolites undetermined, Cephalaspis, etc.

¶ "Synoptical View of Old Red Sandstone," Quarterly Journal, Geological Society, vol. 15 p. 436.

‖ This statement was made on the information of a friend. I have since read Mr. Mitchell's paper (Quarterly Journal, Geological Society, vol 17, p. 145), Dipterus is not there mentioned; but fossils belonging to the genera Acanthodes, Diplacanthus, and Ctenacanthus are mentioned as occurring in these beds.

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upper division. A scale of Holoptychius nobilissimus, found by Sir Roderick Murchison on the Daren, near Crickhowell, prior to the publication of the "Silurian System," was the only indication we had of the upper beds, until the discovery at Farlow, in Shropshire, two or three years ago, of a new species of Pterichthys in yellow sandstone, overlaid by the shale of the Carboniferous Limestone of Clee-Hill, and the more recent discovery at the same place, by Mr. Lightbody and Professor Melville, of the remains of Holoptychius.* I hope, therefore, our indefatigable Ludlow members will pursue their researches further in this direction, and that Dr. Bevan and our Abergavenny members will vie with them in the endeavour to trace the limits of the uppermost beds of Old Red.† I cannot help noticing, before I quit this subject, an erroneous notion (adopted by Sir Roderick Murchison in the appendix to the last edition of Siluria, p. 559) that the Old Red Sandstone is necessarily a red rock. He says, "the true base in Shropshire and Herefordshire of the Old Red Sandstone, properly so-called, is, I repeat, seen to be a red rock, containing Cephalaspis and Pteraspis, and gradually passing down into the grey Ludlow rock." Now, although this is generally the case in the Old Red of Herefordshire, we know that it is not universally so: the sandstones in the neighbourhood of Kington, Hay, and other parts of the northern side of the County, are overlaid with red soil, arising from the denudation of the Black mountains and other elevated masses of the Old Red, but the rocks beneath, including those which contain Cephalaspis Lyellii, are generally a grey micaceous sandstone. In this as in other similar cases, we must look to fossil contents rather than to colour and lithological composition as the truest indicator of the age of rocks.

But the geological observer may not only view the imbedded fossils as the indicators of the stratigraphical position of the rocks in which they are found; but he may view them with the eyes of a naturalist, and compare them with animals which now exist, tracing the affinity of extinct to existing species; he will thus note their differences, learn their habits, and form a notion of the conditions under which these animals of the past existed—he will marvel that the worm should have left its track and burrows, the ebbing tide its ripple, and the raindrop its record on the surface of the rocks; he will observe the Trilobite, one of the earliest crustaceans, attain its greatest development in the Silurian period, and gradually become extinct in the Carboniferous rocks—he will be struck with its varied form, elaborate structure, and the countless facets of its eye—he will compare the Orthoceratites and the numerous Cephalopods with their allies, the extinct Ammonites, and the Nautilus of the present seas; and will see in each species the same chambered structure and the same provision for floating on the surface of the water, although the forms are so various and unlike; he will admire the numerous and varied series of Corals and Crinoids in the Limestones, the elegant Star-fishes and numberless Mollusca of the Silurian seas, and when these last are gradually dying away, he will see the Pterygoti and Eurypteridæ, the largest of Crustaceans, for a brief time the principal occupants

* Symonds' "Old Red Sandstones of Herefordshire," ubi supra.
† Morris and Roberts "on the Yellow Sandstone and Mountain Limestone of Oreton and Farlow." Quarterly Journal, Geological Society, vol. 18, p. 94.

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of the deep, in their turn succeeded by the Fishes, and at last a Flora, of which faint traces before appeared, of gigantic Ferns, Palms, and Conifers, covering the surface of the earth with a luxuriant tropical vegetation, and he will rise from the contemplation of the subject more and more impressed with the infinite wisdom, power, and goodness of God in the works of creation.

When we consider in how few places the crust of the earth is broken, and how seldom, when the rocks are exposed to our view, we have an opportunity of arriving at their contents, we may reasonably expect that fresh discoveries will from time to time reward the persevering searcher of the Palæozoic rocks. We know how the accidental discovery of a Star-fish at Church Hill led to a further search, and an addition of thirteen or fourteen new species of Star-fishes to the three or four species previously known in the Silurian rocks, and to the discovery of several new species of Crustaceans ;—how the discovery of the contents of the Downton Sandstone at Bradnor, and of its equivalent at Lesmahago, induced a general search in the beds which range upwards into the Old Red, and the results ; and how the beautifully preserved forms of the Lanarkshire Pterygoti enabled Mr. Salter to arrange the scattered members of Pterygoti in other rocks, and by comparison to discriminate the different species. We know, too, that the Cornstones of Herefordshire have recently yielded several new species of fishes, and many more specimens of previously known species than were a few years since supposed to exist in the Herefordshire Old Red, and we have every reason to believe that the contents of these beds are still unexhausted mines, which will gradually unfold new facts to the diligent and constant observer.

I feel that I am promoting the interests of the Club when I call your attention to the Museum at Ludlow, and urge the members of this Club to give it their aid and support, either by contributions to its funds, or the gift of specimens of those branches of Natural History which it contains. Those of us who have visited it must feel the aid which we have derived from the inspection of the specimens of Ornithology and Fossils in its well-arranged cases, and from the valuable works of reference which its small but well-selected library contains.

I may reasonably be expected to touch on other subjects, which the idea of a Naturalists' Field Club embraces, such as the Ornithology, the Entomology, and the Botany of the district. The fact that none of these subjects have, during the past year, been brought under the notice of the Club, in some measure relieves me from a charge of omission. I must, however, admit my inability to offer any useful observations or suggestions on these subjects, and confine myself to a request that any members, whose tastes and inclinations lead them to the study of any of these branches of Natural History, will record the result of their observations in a written paper, and bear in mind that the colleetion of a number of common-place facts leads to a useful result.

Mr. Crouch, in his Presidential Address on January 22nd, 1856, very clearly and ably explained to you the scope of the Flora of Herefordshire, which has been prepared under the direction of Mr. Purchas ; hopes were entertained that a part of it would be placed in the publisher's hands during the past year. Mr. Symonds,

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of Pendock, undertook to supply, by way of preface, a short account of the geology and soil on which the plants grow. If I remember rightly, the manuscript, although in a forward state, was not ready for the printer, and therefore the publication was delayed. On behalf of the Club, I venture to express a hope that Mr. Purchas will endeavour to carry out, in part at least, during the present year, the completion of a work which will so greatly assist the systematic Botanist, and will reflect so much credit on himself.

One other subject occurs to me as worthy of a few remarks. The Aquarium, now so easily procured and managed, enables us to observe the structure, and study the habits, of the numerous animals which frequent our streams and ponds —the gradual development of the tadpole, of the frog, and the newt; and the transformation of the insects whose larvæ are aquatic, as the gnat, the dragon fly, and the may-fly, and the beetles and other insects whose life is spent in the water —we may watch their movements and see how the countless forms of animal life, which abound in the water, are reduced in number by the predatory habits of each other—we may watch the sportive activity of the smallest of our fishes; the mode in which the crayfish propels himself, the use which it makes of those jaw feet, which were so fully developed in the Pterygoti, and in how wonderful a manner it periodically emerges from its shelly covering, and withdrawing all its members, even the delicate antennæ, casts aside in an entire form its old coat, and appears in all the splendour of a new one. But, in addition to these recorded facts, I think the Aquarium will enable us, by careful observation, to record many new facts which otherwise would escape our observation, especially in the winter season, under the influence of a low temperature, when these inhabitants of the water disappear, and fall more or less into a state of torpidity or comparative sleep.

A suggestion has been made to me that the Club might with great advantage increase the number of its members, and have six Field Meetings in the course of the year. As regards the number of members, I think, if occasion should require, the Club might advantageously alter the rule which limits our Club to fifty members, but I am not aware that at present we have any candidates for admission to justify its alteration. If we increase the number of our Field-days, I fear our meetings will not be so well attended as they are at present, for if we look over the list of our members we shall see that by far the larger portion has engagements which have a prior claim on its attention, and can only make the study of Natural History an "employment for its idle time, which is then not idly spent"; but I see no reason why those members who have leisure time may not, with great advantage to the Club, visit localities which are now comparatively inaccessible to the Club as a body, report the result of their discoveries to the Field Meetings, and thus extend our knowledge of the district.

I cannot conclude without expressing to the members generally my deep sense of the honour which they conferred on me in my election as President of the Club, and tendering to them my sincere thanks for the kind support and friendly aid which they have so readily given me at the field meetings, and whenever I have had occasion to seek for information during the past year. I resign my office to

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my successor in the fullest confidence that the members will heartily co-operate with him in an endeavour to make the Field Meetings of the present year as attractive as possible, to promote the objects of the Club, and to increase its prosperity.

RICHARD W. BANKS.

7th February, 1861.

CAPTAIN GUISE'S LIST.

Coleoptera.

Elaphrus cupreus	Garway.
Ctenicerus pectinicornis	Kentchurch Park.
Saperda ferrea	Ditto
Onthophagus fracticornis	Garway.
Aphodius merdarius	Ditto.
Luperus flavipes	Saddlebow.
Galeruca cratægi	Kentchurch.
Mecinus semicylindricus	Hedges.
Magdalinus atramentarius	Ditto.
Rhinonchus pericarpius	Ditto.
Sciaphilus muricatus	Ditto
Phyllobius argentatus	Ditto.
Polydrosus cervinus	Ditto.
Tropiphorus mercurialis	Ditto.
Otiorhynchus picipes	Ditto.
Anthonomus rubi	Ditto.
———— ulmi	Ditto.
Balaninus pyrrhoceras	Ditto.

Homoptera.

Centrotus cornutus	Hawthorn Blossoms.

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LIST OF FOSSILS.

CRUSTACEA.		Caradoc.	Lower Llandovery.	Wenlock.	Lower Ludlow.	Aymestry.	Upper Ludlow.	Downton Sandstone.	Passage Beds.	Old Red.	LOCALITY.
Acidaspis Caractaci	Salter	1									Gretton.
——— Coronata	Do.				1						Elton Lane, Vinnall.
Ampyx parvulus				1							Burrington.
——— pennatus		1									Onny River section.
——— n. sp.	Salter	1									Ditto.
Ceratiocaris robustus					1		1				Church Hill, Leintwardine, Whitcliffe, Bradnor Wood.
——— leptodactylus ..					1						Church Hill.
——— cassia					1						Bow Bridge.
——— Murchisoni					1						Church Hill.
——— gigas					1						Ditto.
——— princeps					1						Trippleton.
——— vesica					1						Ditto.
Cyphaspis megalops					1						Vinnall Lane.
Eurypterus sp ?	Salter										Church Hill, Ludford.
——— pygmæus	Quart. Journal, Geol. Society, vol. 15, p. 229						1	1	1		Ludford Shales, Bradnor, Kington, Railway cutting, Ludlow.
——— megalops									1		Railway cutting, Ludlow.
——— acuminatus ..								1	1		Bradnor Railway cutting, Ludlow.
——— linearis							1	1			Ludlow, Bradnor.
——— abbreviatus ..								1			Bradnor.
——— Symondsii										1	Cornstones, Rowlestone, near Ewyas Harold
——— n. sp.	Salter				1						Church Hill.
Illænus Davisii		1									Onny River section.
Limuloides optatus					1	1					Church Hill.
——— n. sp. (Marston) ..							1				Near Ludlow, Mary Knoll Dingle.

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CRUSTACEA.		Caradoc.	Lower Llandovery.	Wenlock.	Lower Ludlow.	Aymestry.	Upper Ludlow.	Downton Sandstone.	Passage Beds.	Old Red.	LOCALITY.
Leperditia marginata	Rupert Jones ..						1	1	1		Bradford, Ludford Lane, Tin Mills.
Lichas Buchlandi						1					Whitcliffe.
laxatus		1	1								Batch gutter, Hordesley Road, South end Longmynd.
Phacops apiculatus		1									Hordesley.
Pterygotus arcuatus	Salter Memoirs, G.S.				1						Church Hill.
——— punctatus	Do.				1		1				Church Hill, Bradnor Wood, Whitcliffe.
——— Banksii	Do.						1	1	1		Ludford Lane, Bradnor, Railway tunnel, Ludlow; Tin Mills, Downton.
——— Stylops	Do.							1			Bradnor.
——— Ludensis	Do.								1		Ludlow Railway cutting, Ledbury.
——— gigas	Do.							1			Bradnor, Forge Bridge, Onibury.
——— problematicus ..	Do.						1	1	1	1	Ludlow Bone-bed and Railway cutting, Bradnor; Cornstones, Hopton Gate.
Parka decipieus (egg packets of Pterygotus)									1	1	Railway tunnel, Tin Mills, Bouldon.
Crustacean, n. sp.	Monograph 1, G.S. p. xii., fig. 16						1				Ludlow.
Crustacean, n. sp.	Ibid, pl. xiii., fig. 17				1						Leintwardine.
Proetus Stokesii	Murchison				1						Bow Bridge.
——— n. sp. (lowest car.) ..	Salter	1									Horderley.
——— latifrons	McCoy				1						Church Hill.
——— n. sp. (in purple shales)	Salter			1							Onny section.
Remopleurides radians	Barrande	1									Onny River Section.
Crustacean tracks?										1	Leysters, and at Boulden in Corvedale.

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ASTERIADÆ.		Caradoc.	Lower Llandovery.	Wenlock.	Lower Ludlow.	Aymestry.	Upper Ludlow.	Downton Sandstone.	Passage Beds.	Old Red	LOCALITY.
Palasterina primæva	Salt. ann., N.H., Nov., 1857				1						Church Hill.
Palæocoma Marstoni	Do.				1						Ditto.
——— Colvini	Do.				1						Ditto.
——— cygnipes	Do.				1						Ditto Trippleton.
——— n. sp.	Do.				1						Ditto.
Bdellacoma vermiformis ..	Do.				1						Ditto.
Rhopalocoma pyrotechnica ..	Do.				1						Ditto.
Protaster Miltoni	Do.				1						Ditto Trippleton.
——— leptosoma	Do.				1						Ditto.
——— n. sp.	Do. ..				1						Ditto.
Palæodiscus ferox	Ed. New Ph. Journal, Jan., 1861. W. Thomson				1						Ditto.
——— gothicus	Do.				1						Ditto.
Echinocystites pomum	Do.				1						
——— uva	Do.				1						
Starfish, n. sp., Caractaci ..		1									Soudley.

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FISHES.	Caradoc.	Lower Llandovery.	Wenlock.	Lower Ludlow.	Aymestry.	Upper Ludlow.	Downton Sandstone.	Passage Beds.	Old Red.	LOCALITY.
Pteraspis, n. sp.				1		1				Church Hill, Whitcliffe.
——— Banksii							1			Bradnor, New Barn, Kington, Lodge Farm.
——— truncatus							1			Huntington, Michaelchurch Hill, P. Banksii at Timperley, near Bewdley.
——— Lewisii									1	Leverhill.
——— Lloydii									1	Near Whitbach, Orcop, Leverhill.
——— Crouchii									1	Bouldon, Leverhill.
——— rostratus									1	Targrove (Downton Hall), Leverhill.
——— ornatus									1	Leverhill.
Cephalaspis Lyellii									1	Whitbach, Leverhill, Leysters, Ewyas Harold; Rodd, near Kington. Pontrilas.
——— Murchisonii ..								1		Right bank of Teme, Ludlow, Ledbury.
——— Salweyi									1	Acton Beauchamp, Whitbach, Leverhill.
——— Asterolepis									1	Hayton's rent ?
——— ornatus								1		Railway cutting, Ludlow.
——— sp., new ?									1	Oakley Park, lower beds.
Auchenaspis Salteri								1		Railway cutting, Ludlow, Ledbury.
Plectrodus						1		1		Ludlow bone bed, Railway cutting, right bank of Teme.
Onchus Murchisoni						1	1	1		Ludlow and Kington bone-beds, Bradnor, Railway cutting.
Small fish-heads like Cephalaspis							1			Bradnor Hill, Norton, near Onibury, Ludford Lane, Downton Castle.

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LIST OF ANIMALS, BIRDS, &c., OF HEREFORDSHIRE.

R. M. LINGWOOD.

The names are according to L. Jenyns in his Manual of British Vertebrata.

MAMMALIA.

Meles taxus	Badger.
Mustela foina	Marten-cat.

Rare. Moccas.

——— putorius	Pole-cat.
——— vulgaris	Weasel.
——— erminea	Stoat.

In white winter garb, Feb., 1840, at Mordiford. Ditto, 1855, at Llanwarne.

Lutra vulgaris	Otter.
Canis vulpes	Fox.
Talpa europæa	Mole.
Sorex araneus	Shrew.
—— fodiens	Water Shrew.

Mordiford and Lyston.

Erinaceus europæus	Hedgehog.
Rhinolophus Hepposideros	Lesser horse-shoe Bat.

Over kitchens at Sufton Court.

Vespertilio noctula	Noctule.

Forty-seven individuals found in hole in ash-tree, at Sufton Court.

——— pepistrellus	Pepistrelle.

Caught on the wing, December, 1839.

——— auritus	Greater long-eared Bat.
Sciurus vulgaris	Squirrel.
Myoxus avellanarius	Dormouse.
Mus sylvaticus	Field Mouse.
—— musculus	House Mouse.
—— decumanus	Brown Rat.
Avvicola amphibia	Water Rat.
——— agrestis	Field Vole.

Exceedingly numerous in the summer of 1839, more than 200 being caught in making hay on 25 acres.

——— riparia	Bank Vole.

Two specimens only have come into my hands.

Lepus timidus	Hare.

May 27, 1839. My keeper drew my attention to a hare carrying something in her mouth, she passed about four yards from us in the open field, and we distinctly saw she had a leveret, a few days old, in her mouth.

Lepus cuniculus	Rabbit.

Black and yellow varieties occasionally.

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AVES.

Falco peregrinus — Peregrine Falcon.
Stoke Edith, March, 1855. Alton Court, 1857.
—— subbuteo — Hobby.
Rare. Bred in Haugh Wood, Mordiford, 1846. Shot at Pencoyd, 1854, by Mr. Palmer.
—— Æsalon — Merlin.
Seen on wing, 1858, at Llanwarne. Killed at Kinnersley, 1845.
—— tinnunculus — Kestrel.
Accipiter fringillarius — Sparrow Hawk.
Milvus ictinus — Kite.
Rare. Killed at Stricksteyning, Much Birch.
Buteo vulgaris — Buzzard.
—— cyaneus — Hen Harrier.
Llanwarne, 1854.
Otus brachyotus — Short-eared Owl.
Shot at Marden, 1845. Ditto near Ross. Mordiford, 1839.
Strix flammea — White Owl.
Syrnium aluco — Tawny Owl.
Lanius collurio — Red-backed Shrike.
Not common.
Muscicapa luctuosa — Pied Flycatcher
Shot a pair at Sufton Court, June, 1839. Saw a pair at Aymestry, 1854
—— grisola — Spotted Flycatcher.
Cinclus aquaticus — Water Ouzel.
Turdus viscivorus — Missel Thrush.
—— pilaris — Fieldfare.
Very numerous in December, 1839
—— musicus — Song Thrush.
—— iliacus — Redwing.
—— merula — Blackbird.
Occurs with white marks in its plumage.
—— torquatus — Ring Ouzel.
Black Mountains. Migrates in September.
Accentor modularis — Hedge Sparrow.
Sylvia rubecula — Redbreast.
—— Phœnicurus — Redstart.
—— phragmitis — Sedge Warbler.
—— luscinia — Nightingale.
Not common.
—— atricapilla — Blackcap.
—— cinerea — Whitethroat.
—— curruca — Lesser Whitethroat.
Not common.
—— sibilatrix — Wood Wren.
—— trochilus — Willow Wren.
—— hypolais — Chiff Chaff.
Regulus aurocapillus — Gold-crested Wren.

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Regulus ignicapillus — Fire-crested Wren.

Sufton Gardens and Lyston. The more generally dispersed species

Motacilla alba — Pied Wagtail.

——— Boarula — Gray Wagtail.

A constant resident.

——— neglecta ? — Blue-headed Wagtail.

Only seen and not handled, therefore a little doubtful. At Lyston, Nov., 1840.

——— flava — Yellow Wagtail (rare).

Anthus pratensis — Meadow Pipit.

——— arboreus — Tree Pipit.

Not common. Near Ross, 1849.

Saxicola œnanthe — Wheatear.

——— rubetra — Winchat.

——— rubicola — Stonechat

Parus major — Great Titmouse.

——— cæruleus — Blue Titmouse.

——— palustris — Marsh Titmouse.

——— ater — Cole Titmouse.

——— caudatus — Long-tailed Titmouse.

Bombycilla garrula — Bohemian Waxwing.

In flesh at Baker's, in Hereford, 1856.

Alauda arvensis — Skylark.

Observed perched on hedge, and then on a low bush. Short-toed Lark?

——— arborea — Woodlark.

Emberiza nivalis — Snow Bunting.

In flesh at Baker's, December, 1854. Shot at Pool Cottage, 1856

——— miliaria — Common Bunting.

Not common.

——— Schœniclus — Reed Bunting.

——— citrinella — Yellow Bunting.

——— cirlus — Cirl Bunting.

Near the Callow Turnpike, 1852. June, 1863.

Fringilla cælebs — Chaffinch.

——— montifringilla — Mountain Finch.

Killed at St. Weonards, March, 1855

——— domestica — House Sparrow.

——— montana — Tree Sparrow.

——— coccothraustes — Grosbeak.

At Lyston, 1847. Ayleston Wood, May, 1849, nesting? Lyston, March, 1860

——— chloris — Greenfinch.

——— carduelis — Goldfinch.

——— spinus — Siskin.

Appears every winter.

——— Linaria — Redpole.

——— cannabina — Grey Linnet.

——— montium — Twite.

Black Mountains.

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Pyrrhula vulgaris	Bullfinch.
Loxia curvirostra	Crossbill.

In flesh at Baker's, Gunsmith, Hereford, 1855.

Sturnus vulgaris	Starling.
Corvus corax	Raven.

Bred in several places, but each year becoming more rare.

——— corone	Crow.
——— cornix	Hooded Crow.

Shot at Llanwarne, Jan., 1850. Shot at Perrystone, Feb., 1860.

——— frugilegus	Rook.
——— monedula	Jackdaw
——— Pica	Magpie.
Garrulus glandarius	Jay.
Picus viridis	Green Woodpecker.
——— major	Great spotted Woodpecker.

Mordiford, 1840.

——— minor	Small spotted Woodpecker.
Iÿnx torquilla	Wryneck.
Certhia familiaris	Tree Creeper.
Troglodytes europæus	Wren.
Upupa epops	Hoopoe.

Rare. Callow Hill. 1847. At Baker's, 1856.

Sitta europæa	Nuthatch.

Two specimens killed themselves by flying against the glass of Conservatory into which they had entered by open doorway.

Cuculus canorus	Cuckoo.
Alcedo ispida	Kingfisher.
Hirundo rustica	Swallow.
——— urbica	Martin.
——— riparia	Sand Martin.
Cypselus apus	Swift.
Caprimulgus europæus	Goatsucker.

Not very generally dispersed, but numerous in some localities. (Orcop)

Columba palumbus	Ringdove.
——— œnas	Stockdove.
——— Turtur	Turtledove.
Phasianus colchicus	Pheasant.
——— torquatus	Ring-necked Pheasant.

Pied varieties occasionally.

Tetrao tetrix	Black Grouse.

Occasionally on the borders of Radnorshire.

——— scoticus	Red Grouse.

Black Mountains, heavier than Sotch birds.

Perdix cinerea	Partridge.
——— coturnix	Quail.

Killed at Belmont, near Hereford, 1847. Killed at Llanwarne, 1852, R. M. L. Killed at Fawley.

Charadrius pluvialis	Golden Plover.

Black Mountains, rare, 1849.

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Vanellus cristatus — Lapwing.

Ardea cinerea — Heron.

Bred near Newcourt, but not for some years past.

——— stellaris — Bittern

Shot on the Wye, by J. Griffiths, Esq., 1849.

Numenius arquata — Curlew.

Very rare. Seen in the flesh at Baker's, gunsmith, Hereford; whether killed in the county (?).

Œdicnemus crepitaus — Thick-kneed Plover.

Seen in the flesh at Baker's, 1854: killed at Lyde.

Totanus hypoleucus — Sandpiper.

Limosa rufa — Bartailed Godwit.

Shot on Lugg at Mordiford, 1839.

Scolopax rusticola — Woodcock.

Has bred at Trepenkennet and Dinmore Hill Wood.

——— gallinago — Snipe.

——— gallinula — Jack Snipe.

Phalaropus lobatus — Grey Phalarope.

Shot at Allensmore, 1847.

Rallus aquaticus — Water Rail.

Crex pratensis — Corn Crake.

—— porsana — Spotted Crake.

Shot at Wormside, Allensmore, 1849.

Gallinula chloropus — Moorhen

Fulica atra — Coot.

Anser ferus — Wild Goose.

—— segetum — Bean Goose.

Cygnus ferus — Whistling Swan.

——— Bewickii — Bewick's Swan.

Killed near Ross, on the Wye, 1854, by Mr. A. Armitage.

Anas boschas — Wild Duck.

—— crecca — Teal.

—— clypeata — Shoveller.

Killed at the Mynd e, 1858.

Mareca penelope — Widgeon.

Fuligula ferina — Pochard.

Killed on Wye, 1855, by Mr. Armitage.

——— marila — Scaup Pochard.

In flesh at Baker's, 1855.

——— cristata — Tufted Pochard.

Mr. Moss, Ross.

Mergus merganser — Gooseander.

In flesh at Baker's, 1855.

Podiceps minor — Dabchick.

——— cristatus — Crested Grebe.

Mr. Moss, Ross, young bird, 1859.

Colymbus septentrionalis — Red-throated Diver.

Caught on ice near Ross, 1854.

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Phalacrocorax carbo	Cormorant.

Shot on the Wye, 1856, by Mr. Armitage.

Sterna hirundo	Tern.

Near Ross, 1854.

Sterna nigra	Black Tern.

On Mynde Pool, 1859

Larus canus ?	Gull.
—— tridactylus	Kittiwake Gull.

Mr. Moss, Ross.

REPTILIA.

Lacerta agilis	Lizard.

Not common. Doward Hill.

Anguis fragilis	Blind Worm.
Natrix torquala	Snake.
Vipera communis	Viper.

Specimen killed at Mordiford by myself, measured 2ft. 9in. in length.

Rana temporaria	Frog.
Buteo vulgaris	Toad.
Triton palustris	Warty Eft.
—— punctatus	Common Eft.

PISCES.

Perca fluviatilis	Perch.
Cottus gobio	Bull-head.
Gasterosteus aculeatus	Three-spined Stickleback.

Two or three varieties.

Clupea finta	Shad.

Occasionally ascends the Wye as far as Hereford.

Cyprinus carpio	Carp.
——— gobio	Gudgeon.
——— tinca	Tench.
——— rutilus	Roach.
——— leuciscus	Dace.
——— cephalus	Chub.
——— phoxinus	Minnow
Cobitis barbatula	Loach.
Esox lucius	Pike.
Salmo salar	Salmon.
—— fario	Trout.
Thymallus vulgaris	Grayling.
Platessa flesus	Flounder.

Mouth of Lugg, December, 1839, caught with a worm in angling.

Anguilla acutirostris	Sharp-nosed Eel.
——— latirostris	Broad-nosed Eel.
Petromyson fluviatilis	River Lamprey.

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PERIODIC PHENOMENA.

Observed at Lyston and Llanwarne, Herefordshire, average date of occurrence for seven years, from 1850 to 1857.

Song Thrush sings	January	8
Chaffinch sings	,,	10
Mezereon flowers	,,	16
Hazel flowers	,,	27
Snowdrop flowers	,,	30
Lesser Periwinkle flowers	February	18
Yew flowers	,,	19
Frogs croaking	,,	20
Yellowhammer sings	March	3
Rooks begin building	,,	5
Pilewort flowers	,,	10
Apricot flowers	,,	14
Ringdove cooing	,,	14
Alder flowers	,,	15
Coltsfoot flowers	,,	18
Elder buds burst	,,	20
Sulphur Butterfly seen	,,	20
Daffodil flowers	,,	20
Frog spawns	,,	22
Tortoiseshell Butterfly seen	,,	24
Gooseberry flowers	,,	30
Larch flowers	,,	31
Wych Elm flowers	April	2
Cowslip flowers	,,	2
Chiffchaff Warbler seen	,,	4
Herb Mercury flowers	,,	5
Humble Bee seen	,,	5
Horse-chesnut buds open	,,	9
Fieldfares last seen	,,	9
Field Wood-rush flowers	,,	9
Meadow Ladysmock flowers	,,	11
Queen Wasp seen	,,	14
Cuckoo heard	,,	17
Swallow seen	,,	17
Blackthorn flowers	,,	17
Blackcap Warbler singing	,,	22
Redstart or Firetail seen	,,	22
Martin seen	,,	22
Nightingale heard	,,	27
Sand Martin seen	,,	27
Strawberry flowers	,,	28

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Germander Speedwell flowers	April	28
Orange-tip Butterfly seen	.	28
Horse-chesnut flowers	May	4
Spotted Flycatcher seen	..	9
Whitethorn flowers	..	16
Swift seen	"	16
Oak flowers	"	20
Large Cockchaffer seen	"	20
Mayfly seen	"	21
Laburnum flowers	"	25
Oxeye Daisy flowers	"	29
Landrail heard	June	6
Foxglove flowers	"	9
Small Garden Chaffer seen	"	9
Strawberries ripe	"	12
Wasps plentiful	"	14
White Water Lily flowers	"	21
Lime-tree flowers	July	18
Apricots ripe	"	24
Swift last seen	August	6
Swallows and Martins congregating	"	24
Winged Ants appear	"	24
Meadow Saffron flowers	"	24
Yew Berries ripe	"	26
Elder Berries ripe	September	16
Ivy flower	"	22
Swallow last seen	October	16
Martin last seen	"	23
Woodcock first seen	"	23
Redwings and Fieldfares seen	November	18

I would add that there is only a difference of three days in the arrival of the Swift, and four days in that of the Cuckoo, during a longer period of twelve years.

R. M. LINGWOOD.

LYSTON, APRIL, 1860.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING.

JOINT MEETING WITH THE MALVERN CLUB, MAY 23RD AND 24TH, 1861.

LUDLOW, MOCKTRE, LEINTWARDINE.

The members of the Woolhope and Malvern Naturalists' Field Clubs met at Ludlow on Thursday, May 23rd, for two Field Days. The first day's excursion was to examine the Caradoc beds up the Onny Valley, and also at Marsh Brook and Acton Scott. The Malvern friends, who arrived on Wednesday night, proceeded by the train at 8 o'clock next morning to Marsh Brook, and from thence walked to a quarry near Acton Scott, of the Middle Caradoc formation, which is rich in fossil remains. There the members procured *Phacops conophthalmus*, *Orthis vespertilio*, *Orthis unguis*, *Orthis actonia*, *Strophomena grandis*, *Bellerophon bilobata*, and *Leptaena serricea*. Thence the members retraced their steps to Marsh Brook, and examined the sections along the Horderley road. Those nearest the railway station are Caradoc, containing the usual remains, and a little further on are the lower beds of the Longmynd or Bottom Rocks, all the beds of which were considered to be unfossiliferous until Mr. Salter, about two years ago, discovered worm tracks, and a portion of a trilobite, in the blue beds immediately overlying these Olive Shales.

A little further along the road is a large quarry of Bala Limestone (where the members from Hereford were met), the beds of which are all tilted up nearly vertical, and on the lower side of the quarry the lowest beds of Caradoc formation lie conformable to it, containing several scarce and new organisms, such as *Trinucleus concentricus*, a new *Asaphus*, a new *Fenestella*, and several other remains; from the Bala Limestone were procured several specimens of a new *Lingula*.

Thence, crossing the river Onny by the stepping stones, and proceeding by the side of the river, they examined the loose stones that are thrown down from several quarries of the Horderly Flags or Middle Caradoc, amongst which the beautiful Oak-fern, *Polypodium dryopteris*, grows most luxuriantly.

About a mile further down the stream (though up the beds) the celebrated Onny section was reached, showing the Purple Shale or Lower Wenlock, the Pentamerus Limestone, and the uppermost beds of the Caradoc, all in one continuous section. From the Caradoc were procured some fine specimens of *Trinucleus concentricus*, and from the Purple Shale, *Orthis biloba*, *Encrinitus punctatus*, *Leptaena laevigata*, *Atrypa reticularis*, and *Petraia bina*. The Pentamerus Limestone is here a very thin band, containing only *Pentamerus undata*,

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but the water was too high to reach it. From thence a walk of about a mile and a half to Craven Arms and back to Ludlow by train, concluded the first day's excursion over a most interesting and splendid country.

The second day's trip was first to Mocktre, and after examining the fine sections of Aymestrey Limestone and Lower Ludlow, the party proceeded to Leintwardine, where they separated for a short time, Mr. Symonds and Mr. Lightbody going on further to Pedwardine, to examine the small upheaval of Lower Llandeilo Flags, containing *Dichtyonema sociale* in abundance, and a small species of *Obolina*. The remainder of the party went to Church Hill and waited there for Mr. Lightbody to meet them.

The Church Hill quarries are the most productive in new organisms of any section in this locality; more than twelve species of new Star-fish, several new *Encrinites*, a few species of *Ceratiocaris*, and two or three specimens of *Limuloides optatus*, an organism allied to the great King-crab of our existing seas, have been found there. It seems to be a connecting link between the Silurian Trilobite and the Old Red Cephalaspis. In these beds of the Lower Ludlow formation, the oldest known fish was found of the species of *Pteraspis*, but the members were very unfortunate in their day.

After Mr. Lightbody joined, they continued on towards Ludlow, through the beautiful grounds belonging to Downton Castle, in which are some fine sections of Upper Ludlow, and many rare species of ferns are to be procured. At the lower end of the Walks near Downton Castle Bridge, the Upper Ludlow Bone Bed is well exposed, and immediately overlying it is the *Trochus* Bed, from which several small, but perfect, Fish-heads have been obtained. A short walk from here to the Forge Bridge, and back to Ludlow by carriage, concluded the second day's excursion, through a most interesting locality both to the geologist and the botanist. We noticed present the following members and visitors:—WOOLHOPE CLUB:—Mr. Robert Lightbody, President; Mr. George Cocking, and Mr. Elmes Y. Steele, Vice-Presidents; Capt. Guise, hon. member, President of the Cotteswold Club; Messrs. C. T. Bodenham, H. Salwey, T. Curley, Arthur Thompson, A. Wall Davies, M.D., Kington. MALVERN CLUB:—The Rev. W. S. Symonds, President; Mr. Edwin Lees, Vice-President; The Rev. R. Bilson, The Rev. W. Thorn. Mr. Kent. VISITORS:—David M. McCullough, M.D.; The Rev. R. Soper, Messrs. F. Kempson, Alfred Marston, and — Pritchard, Weston-super-Mare.

The Rev. Arthur Gray, of Orcop, was elected a member of the Woolhope Club, and the following gentlemen were proposed:—The Rev. Thos. Woodhouse, Mansel Lacy; David Wylie, Esq., Shrewsbury; Dr. McCullough, and Mr. Wm. Phillips, Hereford.

In his "Sketch of the Proceedings of the Malvern Naturalists' Club" from 1853 to the close of 1865" the Rev. Wm. S. Symonds refers to this Field Meeting in 1861 in conjunction with the Woolhope Club at Ludlow, in the following words:—"We were specially interested in the fossils found in the *Passage*

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Beds or basement beds of the Old Red Sandstone in the railway cutting at Ludlow, which co-relates so exactly with those found within the shaft and at the northern entrance of the Ledbury tunnel near the railway station there."

"The fossils from Farlow in the Ludlow Museum are well worthy of notice, as they are from those newer Passage Beds which intervene between the Old Red Sandstone and the Carboniferous deposits, aud contain the remains of two Scotch genera of fossil fishes, the *Holoptychius* and *Pterichthys*." (See Transactions of the Malvern Club, Part III., Page 22).

Rev. Wm. S. Symonds was requested to re-publish this Paper* which appeared in the Edinburgh New Philosophical Journal. £5 was voted toward the expenses. (See Transactions of the Malvern Club, Part III., Page 23).

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* "Geology of the Railway from Worcester to Hereford," by Rev. W. S. Symonds. This was afterwards published by Hardwicke, 192, Piccadilly, London, 1862; Re-printed with additions and corrections from the "Edinburgh New Philosophical Journal," New Series, April, 1861, with Section both of Malvern Hill and Ledbury Tunnel.

This reprint will be found commencing Volume III. of bound pamphlets B 85 in the Reference Library, Hereford; and in the same Volume, see No. 42, Extracts, with two sections (as above) from pages 204 to 232 of the "Edinburgh New Philosophical Journal," New Series, Vol. XIII., Plate VI. (*Editor*).

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Woolhope Naturalist's Field Club.

SECOND FIELD MEETING, FRIDAY, JUNE 21ST, 1861.

TARRINGTON.

The second Field Meeting for 1861 was held at Tarrington Vicarage, by the invitation of Rev. Charles Smith, on Friday, June 21st. There were present:—Mr. Robert Lightbody, President, and Mr. Elmes Yelverton Steele, Vice-President, Rev. W. S. Symonds, Honorary Member, President of the Malvern Club, Rev. J. F. Crouch, Honorary Secretary, Messrs. R. W. Banks, Chas. Thos. Bodenham, P. Ballard, Thos. Blashill, Philip Baylis, Henry Jenkins, Colonel Colvin, Revs. H. T. Hill and Charles Smith, Mr. Arthur Thompson, Treasurer and Assistant Secretary, and about twelve visitors.

After breakfast the members proceeded through Stoke Edith Park to Adam's Rocks, where a lecture upon the surrounding district was given by Rev. Wm. S. Symonds.

The Limestone quarries at Dormington were afterwards visited.

On their return to Hereford, the following joined the party at the dinner at the Green Dragon Hotel:—Mr. Thomas Cam, Mayor of Hereford, Dr. W. L. Gilliland, Mr. Charles Lingen, and Mr. Henry Blashill.

Mr. Thomas Blashill read a short paper and exhibited several specimens of Flint implements found in the Drifts of Abbeville and Amiens in France, lent for the purpose by the British Archæological Society.

At this meeting several members, Presidents, and other officers of the Cotteswold, Malvern, Warwickshire, and Worcester Naturalists' Clubs were elected Honorary members.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, FRIDAY, 9TH AUGUST, 1861.

ABERGAVENNY, SCYRRYD FAWR.

The third and last meeting for the season of the Woolhope Naturalists' Field Club was held at Abergavenny on Friday, August 9th, when the following gentlemen were present:—Mr. Robert Lightbody, President; George Cocking and Mr. Elmes Y. Steele, Vice-Presidents; Chandos Wren Hoskyns, Esq., President of the Warwickshire Club; Edwin Lees, Esq., Vice-President of the Malvern and Worcestershire Clubs; and the following members of the Woolhope Club:—Dr. Bevan, Rev. J. F. Crouch, Hon. Sec., Col. Colvin, Mr. T. Curley, C.E., Rev. H. T. Hill, Mr. T. Cam, Dr. Gilliland, Mr. J. E. Smith, Rev. Charles Smith, Dr. Steele, Rev. T. Woodhouse, and Mr. Arthur Thompson, Treasurer and Assistant Secretary. Visitors.—Rev. T. H. Bird, Messrs. Colvin, Cunningham, Crouch, Rev. W. D. Duncombe, Messrs. Davies, John Kent and Son, A. Marston, Nichol, Rev. — Pigott, Mr. Martyn Roberts, Dr. Thom, and Mr. W. H. West. Rev. Thomas King was elected a member.

Sir Charles Hastings, the President of the Worcestershire Natural History Society, was (on the proposition of Mr. Arthur Thompson, seconded by the Rev. Chas. Smith) elected an honorary member.

A notice was read from Sir Charles Hastings inviting the members of the Club to attend the Annual Meeting of the Worcestershire Society at Worcester on the 17th of September. A similar invitation had been sent to the other Field Clubs.

Dr. M'Cullough, Superintendent of the United Counties Lunatic Asylum, had courteously invited the party to breakfast, and most hospitably and bountifully had he provided for his guests. The Naturalists were first conducted by Dr. M'Cullough to a quarry in the grounds of the Asylum, where, in the Cornstone, specimens of some of the characteristic fishes of the Old Red Sandstone had been obtained; and, after some hammering here, though with no remarkable results, the route was taken direct for the Scyrryd-fawr, or Great Scyrryd Hill. In progressing to this mountain, a deep watery ravine was passed, where the *Scolopendrium vulgare*, and several species of *Lastræa* flourished exceedingly in the deep gloom. Indeed, the botanical interest of the day centered in the ferns; for the barren steeps of the Scyrryd produced scarcely anything else but a dense growth of the common brake, *Pteris aqilina* and masses of the *Ulex gallii*, which, however, made a pretty show with their golden flowers. The day was dubious

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and fitful, though the "pink-eyed pimpernel" was observed fully expanded, even while scuds of rain and vapour swept furiously over the landscape, and was pronounced a gay deceiver.

With some difficulty, the mountain base was reached, and by a path across its shoulder, the opposite side was gained; and here, from the cliffs of sandstone having broken down and spread widely over the declivity, a singular wild and subalpine scene comes before the eye, which, under the influence of a gloomy sky, and the inky clouds that covered the crest of the Sugar-Loaf mountain opposite, had the appearance of a rocky wilderness amidst impervious fastnesses. Over this broken ground, various ferns and mosses spring up, while tabular and broken rocks that have fallen from the precipices above are dispersed irregularly around. By a steep natural flight of stairs the crest of the ridge was at length gained, where some remnants of an oratory appear; but the boisterous wind and driving scud rendered it unpleasant to remain here long, and the extensive mountainous views could be only seen in partial snatches, though a sunny gleam rested upon Abergavenny and the valley of the Usk.

The party now descended into the Gap, a great hollow intervening between the great mass of the Scyrryd and a wooded fragment (itself a good-sized hill) that at some former period has, by a landslip, broken away from the parent mass, and now, like a cub, reposes at the foot of its mother.

Here it had been announced that an acceptable lunch would be in readiness and Mr. E. Y. Steele, the kind-hearted founder of the intended feast, had spoken in praise of exquisite old cider that he had selected from the recesses of his cellar, and which was believed would prove to have had a body within it. The naturalists, weary and thirsty after their assault of the hill, had pressed forward rather impatiently towards the siderial region; but, alas—

The best laid schemes o' mice and men
Gang aft agley;

and after no little delay, and considerable anxiety, it was announced that some mistake must have occurred, or the supplies had been intercepted.

As a last resource, to give the commissariat a chance to come up, Dr. Bevan mounted a rock by the side of the President, Mr. Lightbody, and delivered an instructive lecture on the iron ores present in almost every geological formation, and stated the amount of iron contained in each ore. This was received with applause; and the company having again "sighed and looked," but without avail, gave up the lunch and the cider in despair, and turned their steps towards Llanfihangel, which, after threading some deep and miry watery lanes, they at last reached about 4 o'clock. Here a quarry containing many interesting specimens of Old Red fossils rewarded the hopes of the geologists, and several good captures were made.

The party dined at Abergavenny.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING,

THURSDAY, FEBRUARY 20TH, 1862.

The General Annual Meeting of the Club was held at the Green Dragon Hotel, on Thursday, 20th February. Present: Mr. Robert Lightbody, President, Mr. George Cocking, and Mr. R. M. Lingwood, Vice-Presidents; Rev. J. F. Crouch, Honorary Secretary, Mr. Chandos Wren Hoskyns, Dr. Bull, Mr. Thomas Cam, Colonel Colvin, Rev. R. Dixon, Mr. R. Johnson, Rev. T. H. Lee Warner, Rev. Chas. Smith, Mr. J. E. Smith, and Mr. Arthur Thompson, Treasurer and Assistant Secretary.

The minutes of the last meeting were read and confirmed.

Mr. John Jones Cleave, of Hereford, proposed at the last meeting, was elected a member.

Agreeable to notice given at the last Meeting by the Rev. J. F. Crouch, it was resolved that the word "fifty" be struck out of Rule 2, and that of "ordinary" substituted.

The Hon. Secretary presented the report of a deputation of the Club appointed to confer with a deputation of the Herefordshire Philosophical, Literary, Antiquarian, and Natural History Society, with a view of effecting the union of the two Societies. It was explained that the joint deputations had passed a resolution at their meeting on the 15th of January, to the effect that it was desirable that the Woolhope Club should unite with the Herefordshire Philosophical Society, on terms to be hereafter arranged by the joint committees of the two societies, and a prolonged discussion followed the presentment of the report, which terminated in the following resolution, proposed by Mr. Chandos Wren Hoskyns, seconded by Dr. Bull, and carried unanimously:—

"Pending any further arrangements respecting a Museum of Herefordshire specimens, geological, &c., that the Philosophical Society be requested to inform the Committee of the Woolhope Club on what terms they would admit them to a separate or joint use of the Museum-room."

Resolved—That the name of Mr. R. M. Lingwood be added to the deputation.

The Treasurer submitted a statement of the accounts for the past year, which were unanimously adopted, showing a balance of £95 12s. 5d. in favour of the Club, together with the following arrears:—10s. for 1858, 10s. for 1859, 50s. for 1860, and £10 10s. for 1861, amounting altogether to £14. The bill of £10 12s. of Mr. William Phillips, for stationery and printing, was ordered to be paid.

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Resolved—That the following bye-laws having been carried unanimously, be issued with the notices of each Field Meeting:—"That each member not answering the Secretary's circular shall be presumed to intend to be present at the meeting, and shall be held liable for his share of the expenses of conveyance, dinner, &c." "And that each member signifying to the Secretary his intention of attending, shall pay his share of conveyance and dinner, whether he avails himself of them or not, unless he shall have signified to the Secretary his intention to the contrary."

Mr. Robert Lightbody, the retiring President, read his address, and it was proposed by Mr. R. M. Lingwood, seconded by the Rev. Charles Smith, and carried unanimously, that the same be printed in the next number of the "Transactions." The thanks of the meeting were also voted to Mr. Lightbody for his able discharge of the duties of President, and for his exertions in promoting the objects of the Club.

Proposed by Rev. J. F. Crouch, and seconded by the Rev. Charles Smith, that Mr. Chandos Wren Hoskyns be elected President for the present year, which was carried unanimously.

Resolved—That the Rev. Charles Smith, Tarrington; G. P. Bevan, Esq., M.D., Beaufort; R. M. Lingwood, Esq., Lyston House; and Robert Lightbody, Esq., Ludlow, be elected Vice-Presidents for the present year.

Resolved—That the Rev. J. F. Crouch be re-elected Hon. Secretary for the ensuing year.

Resolved—That Mr. Arthur Thompson be re-elected Treasurer and Assistant Secretary for the ensuing year.

Proposed by Mr. Arthur Thompson, and seconded by Mr. R. Lightbody, that the President, Vice-Presidents, and Secretary of the Oswestry Field Club for the time being, be added to the list of hon. members.

The following gentlemen were proposed for election at the Ledbury Meeting: Mr. William Townsend, Hereford, proposed by Mr. R. Johnson, and seconded by Mr. J. E. Smith; Mr. Alfred Marston, Ludlow, proposed by Mr. George Cocking and seconded by Col. Colvin; Mr. J. W. Colvin, Leintwardine, proposed by Rev. J. F. Crouch, and seconded by Rev. Charles Smith.

A letter was read by the President from Dr. A. Wall Davies, Kington, suggesting that one of the Field Meetings should be held this year at Tenbury, which was declined for the present, the locality not being of sufficient interest.

A letter was also read from the Rev. R. P. Hill, Hon. Secretary of the Malvern Club, with a list of their Field Meetings for the present year.

Resolved—That the following days and places be fixed for the Field Meetings for the present year:—

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LEDBURY (to meet the Malvern Club), on THURSDAY, MAY 22ND.

USK, THURSDAY, JUNE 12TH.

HEREFORD, for HOLME LACY STATION, THURSDAY, AUGUST 14TH.

CHURCH STRETTON (to meet the Oswestry Club), on THURSDAY, SEPTEMBER 18TH.

Resolved—That the Assistant Secretary be requested to write to the Rev. W. H. Purchas, to request him to kindly favour the Club with any portion of the *Herefordshire Flora* he may have ready for the press, so that it may be printed with as little delay as possible.

Resolved unanimously—That the indefatigable exertions of Mr. Thompson as Assistant Secretary and Treasurer of the Club merit its warmest acknowledgments, and that he be requested to accept the sum of five pounds to expend in any book or other article as to him may seem best, as a very slight mark of the opinion entertained by the members of the importance of his services to the Woolhope Naturalists' Club.

THE ADDRESS

Of the retiring President, ROBERT LIGHTBODY, ESQ., read before the Members of the Woolhope Naturalists' Field Club, at their Annual Meeting, held in Hereford, on Thursday, February 20th, 1862.

BROTHER MEMBERS,—I am very much at a loss how to address you on this occasion, as I feel strongly my incompetence to discharge properly the duties of my position. It was very repugnant to my feelings to assume the responsible post of your President, and I was only induced to do so because I felt that as a member of your body, I was bound to take my share of its duties when called upon by you. I trust, however, that in future you will be more fortunate in selecting a leader who will be able to amuse and instruct you.

In referring to the Field Meetings we have had during the past year, I may express my regret that the first meeting at Ludlow was so unfortunate in some of its circumstances. Though intended to be a joint meeting of the Malvern Club and our own, our numbers came very short of what might have been anticipated—principally in consequence of the railway trains from and to Hereford not suiting our arrangements, though we were entitled to expect that in May the summer passenger traffic would have been commenced. Another time, however, it would be well to have our first meeting near Hereford, so as to avoid this annoyance.

Another point on which I would remark, is, that so few members of our Club are sufficiently interested in Geology (which I think is our leading object), that it is hardly wise to make arrangements, involving their passing a night from home, thereby incurring expenditure of both money and time which may not be convenient to some of them.

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Further, I may observe that my conduct at the Ludlow meeting having been commented on, both verbally and in print, by some of our friends, I am compelled, in self-defence, to say that I felt bound in courtesy to the learned President of the Malvern Club (who was visiting our territory on that occasion), to consult his wishes as much as possible; and though I fear it produced considerable annoyance to some, it was my misfortune more than my fault, that I could not be in two places at once. The inconvenience, too, might have been lessened, if one of our members, who knew the ground, had accompanied us from Ludlow, instead of walking to Leintwardine. Fortunately all our meetings of the past year were favoured with fine weather, except the last hour of our Tarrington meeting, and a few light showers at Abergavenny. I am not aware that any great discoveries were made on any of these occasions, but perhaps I ought to give a glance at the ground passed over with more or less interest.

On the 23rd of May we left Ludlow by train for Marshbrook, near which place, at Acton Scott, we examined the Caradoc beds, which are there full of heads and tails of Phacops conophthalmus, as well as the usual Caradoc Orthides, &c. Thence we walked to Horderley, passing on the way some very faulted ground, where we found the Upper Llandovery partially shewn at White Birches, with its characteristic Petraia subduplicata, and traces of Pentamerus oblongus. Some distance further along the road we came to beds of the Lower Caradoc or Bala Limestone, which were thrown up on edge between two faults, and do not contain many fossils. Immediately after passing this we found ourselves on the barren Cambrian rocks which skirt the way to Horderly turnpike. Near here we were joined by some of the party from Hereford, who arrived too late for our train, and had walked from the Craven Arms up the valley of the Onny. After enjoying our luncheons, and a little rest, we proceeded down the Onny, passing the prolongation of the bed of Bala Limestone, at a quarry in which a number of fragments of an unnamed Lingula, and one or two entire ones, were found. These beds are almost vertical, and the shale lying above them is well worth a close examination, as it contains, with abundance of Trinucleus concentricus, several other rare or new Trilobites,—and abundance of Beyrichia complicata. There has since been found here a new Beyrichia, which Mr. Rupert Jones has called B. Wilkinsoni. We then crossed the Onny, and after passing the thick hard beds of Horderley Sandstone, which in some of its layers contains abundantly Bellerophon bilobatus, Leptæna serricea, Strophomena grandis, and Modiolopsis orbicularis,—and, growing among the loose stones, great quantities of the lovely Polypodium dryopteris, or oak fern,—we came to a road-cutting leading to Cheney Longueville, where in one stratum is found the curious Sphærospongia hospitalis, so named by Mr. Salter in commemoration of the hospitality displayed by the kind-hearted Duppa Duppa, Esq. A little lower down the river, we came to the Trinucleus shales, at the well-known Onny section, where the slight unconformability of the superimposed Llandovery beds is seen. These shales are full of heads and tails of Trinucleus, with rarely an entire one, and also occasionally a head of Amphyx pennatus, and part of the head of Remopleurides radians. The Upper Llandovery beds overlying these shales were inaccessible without a wetting. They are very thin here, and are succeeded by the Purple

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shales, forming here the lowest part of the Wenlock shale. In them *have* been found tails of Cheirurus bimucronatus, but our party were not so fortunate as to find any. It was now time to return to Ludlow after a very pleasant day.

On the 24th we took carriages to Mocktre, where there is a remarkably fine section through the Upper Ludlow and Aymestry Limestone, down to the Lower Ludlow—in which latter bed such fine specimens of Lituites and Phragmoceras, and also Ischadites Königii have been found. Our labours were not, however, well rewarded, and we went on to Leintwardine. Here we dropped some of our party, who went to look for Star-fish in the celebrated Church Hill quarry, but I am grieved to say, that, partly from want of a guide, but chiefly from the state of the quarry, they were not successful in finding the right beds. In the meantime, my brother President persuaded me to take him, and some others of the party, to Pedwardine, where there is a fine exhibition of the Lingula flag beds (containing abundance of Dictyonema sociale, and a few Lingulellæ ?), lying at an angle of 25° to 30°, and covered nearly horizontally by beds of Llandovery conglomerate. These beds were peculiarly interesting to Mr. Symonds, as being similar in character, though superior in productiveness, to some in the south end of the Malvern Ridge. Unfortunately we spent too much time here, and consequently were unable to examine the interesting ground between Leintwardine and the Forge Bridge, as several members were obliged to get back to Ludlow in time for the train to Hereford.

Of our next meeting at Tarrington, on June 21st, I will say nothing, as it was all old beaten ground for us, except that the Rev. Charles Smith gave us a sumptuous breakfast on his lawn, which was done full justice to by his friends.

On our last meeting at Abergavenny, on August 16th, we were splendidly breakfasted at the Asylum by our friend Dr. McCullough, who was determined not to be outshone by anyone in his entertainment. Here we were on new ground for us, it not having been supposed formerly that the Old Red beds in that neighbourhood were fossiliferous. However, our brother members, Messrs. Elmes Steele and McCullough, having seen the Fish remains of the Old Red near Ludlow, were stimulated to search their own neighbourhood, and were fortunately rewarded by finding, not only shields of Pteraspis Lloydii and Pteraspis Crouchii, as well as Cephalaspis Lyellii and Cephalaspis asterolepis, but also another species of Cephalaspis, which is declared by Professor Huxley (who has the specimens before him) to be quite new. After seeing a large number of specimens—some very fine—and breakfasting, we betook ourselves to the quarry in the grounds of the establishment, whence the stone for the building was obtained. The loose stones there, however, had been too diligently investigated to yield us much beyond fragments, and we soon proceeded to the romantic sides of the Skyrryd, where we had hoped to enjoy the magnificent views of the neighbourhood. Unfortunately, a sharp scud of rain came on, and the mountain tops were obscured by mists. However, after sheltering for a few minutes, we resumed our walk, and while one party went up to the top of the Skyrryd, the rest of us looked (but nearly in vain) at a quarry of Cornstone on the east side of the mountain, where some of the choicest

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specimens had been found. We soon moved on again, and rejoined the Alpine party on the west side, in the wild ravine, which seems formed by a fracture and slip of a great mass of the Old Red beds which have parted, leaving a huge cliff on either side. Here we were entertained by listening to a very instructive address by Dr. Bevan, on the various strata in which Iron Ore is found, which I trust will be printed for our benefit, if, as I hope and believe, our friend had written it out, but had forgotten to bring it with him.

Having rested here on the rocks for some time we walked on, with the occasional mishap of losing one another in the tall gorse, till we got to another quarry, not far from Pandy Station, where we found in the Cornstone some fine shields of Pteraspis, shewing how well worth more close examination than it has hitherto received this neighbourhood is. After a very pleasant day we returned to Abergavenny, much indebted to our kind friends, Drs. McCullough and Steele, for exhibiting to us the treasures of their quarries; and I trust their further investigations will be crowned with success. If each of our members would as actively and continually examine the rocks in his own neighbourhood, whether Silurian, Devonian, or Carboniferous, I feel sure the result would amply reward him—if not in new species, at least in health and geological knowledge, and probably in all three.

And now having (I fear in a tedious manner) gone over the routine of our Excursions, I should wish, if you are not already tired, to say a few words in reference to the classification of the Upper Ludlow, Aymestry, and Lower Ludlow rocks. Our great authority, Sir Roderick I. Murchison, as well as the Maps of the Geological Survey, have laid down the whole of Whitcliff at Ludlow as Upper Ludlow. Our friend Mr. Cocking, soon after I came to live at Ludlow, hinted to me his belief that, notwithstanding these assertions, the Aymestry Limestone was shown there; and though I was then a novice, and quite incompetent to offer an opinion on the subject, I bore his observation in mind. Some time after, I had the great advantage of seeing Mr. Salter at Ludlow, and called his attention to the subject. On breaking off a few fragments of rock at the foot of the hill, he unhesitatingly pronounced that, from a fault existing in a line with the New Bridge, as far as the green slope on the north side of the quarry opposite the next weir, the beds at the bottom of the hill were Aymestry Limestone, as evinced by the abundant presence of Strophemena filosa. Since that time, I have continually examined both these beds and corresponding beds in other localities, and feel convinced that the line of demarcation between the Aymestry Limestone and the upper Ludlow has been drawn in the wrong place—the Aymestry including within its limits the bands of Rhynchonella navicula which Sir R. Murchison considers as the base of the Upper Ludlow. Let it not be considered a matter of no moment whether this band be called the bottom of one, or the top of the other, of two contiguous beds, remembering that the only way in which different beds can be distinguished is by the fossils contained in them respectively. Now the band of rock in question, reaching from the recognized Aymestry Limestone for about thirty or forty feet, perhaps, in thickness, though included in the Aymestry, cannot be called *Limestone*, although it is much more calcareous than

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any bed I know of in the true Upper Ludlow,—but it contains abundantly *Strophomena filosa* and *depressa*, *Atrypa reticularis*, and in the lower part *Lingula striata*, *Encrinurus punctatus* and *variolaris*, and *Proetus Stokesii*, all of which belong emphatically to the Aymestry beds. NONE of these fossils, I believe, can be found above this horizon, while they run through the Aymestry Limestone, and at least to the bottom of the Lower Ludlow.

Another indication of their nature occurs in the existence, in these beds over the limestone, of the honeycomb structure of the faces of the joints, where we find lines of cavities formed by the solution of the calcareous matter in the fossiliferous layers,—the very character on which Sir R. Murchison lays stress as indicating the Aymestry Limestone. This honeycomb formation may be seen more or less, nearly as far as the turn of the sloping walk leading up Whitcliff from the New Bridge.

Does it not then seem clear that the classification should be altered, so as to include all beds in which these fossils and honeycomb markings are found in the Aymestry Limestone, and only refer those above them, which are destitute of such forms, to the Upper Ludlow. The great advantage of this would be to enable us to separate (wherever these fossils are found) the Upper Ludlow from the Lower Ludlow, instead of having them confounded together in the maps by the same colour, wherever the limestone happens to be absent. No doubt the error arose from the Surveyor at that time being unaware of the *faults*, and fancying the Whitcliff beds all of the same nature, because they had nearly the same dip, and all contained *Chonetes lata*, *Rhynchonella nucula*, *Orthonota amygdalina*, and other common Upper Ludlow forms; but these forms *also* run down to the bottom of the Lower Ludlow. When, however, the fossils of the beds I am speaking of were classed with the Upper Ludlow, of course the discrimination of the Lower Ludlow from the Upper Ludlow became impossible, except where the limestone intervened—which yet is often wanting. Still, I am far from assuming that we shall always be able to say whether a certain rock is Upper Ludlow or Lower Ludlow, because in the western parts of these beds, not only is the limestone absent, but the fossils are very few in number, so that, unless we by chance break open a characteristic Lower Ludlow fossil, we shall be still in the dark. It will, however, answer well in many places; and even if it did not, that would be no reason why we should not endeavour to discriminate as much as possible.

The examination of this point has suggested to me the probability of another alteration being required. Looking at the general identity of the fossils of the Aymestry Limestone and Lower Ludlow; at the general prevalence of calcareous beds in both formations—only varying in thickness and frequency; and at the difficulty, if not impossibility, of pointing out, even in the *best* sections (such as Mocktre), where one ends and the other begins; will it not be better to merge the one in the other, and to call the whole series Lower Ludlow?

We have lately seen a further confirmation of this view, in a quarry on the west side of the old Mocktre road, where we find a bed of *Pentamerus Knightii* at

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least eight feet thick, surmounted by two or three feet of laminated shales, similar to those in the Lower Ludlow quarry at Church Hill, and containing the same fossils, and especially at least two species of Starfish, and two or three species of Ceratiocaris. Above this comes another bed of Pentamerus Knightii, twelve to eighteen inches thick, covered by more shales, which last we have not yet examined closely. However, this occurrence of the Lower Ludlow Starfish, in shale lying above a thick bed of palpable Aymestry Limestone, is a very strong indication of identity between the two series of strata.

Perhaps it may be well to observe, in reference to the Lingula flags at Pedwardine, that when I was there the other day, to procure some Dictyonema for a friend, I found what I believe to be part of the head of a small Trilobite, which I immediately sent off to Mr. Salter, who writes that he can make nothing of it, though it *may* be a Trilobite head; but another fossil from the same place he thinks is a new shell. We have never previously found anything else here, except Dictyonema and Lingulella, though several Trilobites belong to the formation.

And now, gentlemen, having, in one way or another, got through my year of office, I take leave of you, rejoicing, not only at returning to private life, but also that you will have, as I am led to believe, a much more efficient President to succeed me.

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Woolhope Naturalists' Field Club.

THURSDAY, MAY 22ND, 1862.

JOINT MEETING WITH THE MALVERN FIELD CLUB, AT LEDBURY.

At this meeting there were present: Rev. Chas. Smith, Vice-President, who acted as President for the day; Mr. R. Lightbody, Vice-President; Col. Colvin. Revs. H. T. Hill, F. Merewether, and J. J. Miller, Dr. McCullough, Messrs. C. T. Bodenham, Philip Baylis, George Cocking, T. Curley, C.E., Henry Jenkins, E. Y. Steele and Arthur Thompson, Treasurer and Assistant Secretary, and the following visitors: Messrs. W. De Blaguire, — Dugard, T. Clarence Porter, Rev. W. Purton, and Mr. A. Smith.

After breakfast the following three members were elected: Mr. J. W. Colvin, Leintwardine; Mr. Alfred Marston, Ludlow; and Mr. Wm. Townsend, of Hereford.

In reply to a letter from Rev. W. H. Purchas enclosing a portion of the *Flora of Herefordshire*, the subject of the publication thereof was referred to the Committee appointed on February 28th, 1860, with the addition thereto of the President, Mr. Chandos Wren Hoskyns, and of Mr. Thompson as Secretary.

The offer of the Herefordshire Philosophical, Literary, Antiquarian, and Natural History Society of the joint use of their Museum Room and services of their Keeper, at an annual rent of £10, was accepted.

The following members of the Malvern Field Club joined the party: Rev. W. S. Symonds, President, Rev. A. H. Winnington Ingram, F.G.S., Rev. R. H. Hill, Honorary Secretary, and others.

The Silurian rocks in the Railway cutting at Hope End were visited by the kind permission of Mr. Thomas Heywood.

After dinner at the Feather's Hotel, the Rev. Wm. S. Symonds delivered an interesting address in connection with the Gravel Drifts in different parts of Europe, more particularly Denmark.

DRIFTS.

Referring to the year 1862, the Rev. Wm. S. Symonds, in the Transactions of the Malvern Club, part III., page 23, remarks: "During this year we paid a

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good deal of attention to the DRIFTS, and I visited the sources of the Severn, Wye, and Usk for the purpose of examining the character of the river deposits among the hills of Wales. I afterwards pronounced an opinion that it was impossible to account for the transportation of the large rock masses, many sharp and angular, in the ancient river beds, without calling in the agency of melting snow and floating ice which stranded blocks from the Longmynd and Clee Hills on the Old Red Sandstone of Lugwardine, near Hereford, or masses of Dudley "toad-stone" on the banks of the Severn at Upton-on-Severn.

It was, I believe, during this latter cold period that our rivers were so much more *torrential* than they are now."

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, THURSDAY, JUNE 12TH, 1862.

USK.

There was a small attendance at this meeting. Rev. Chas. Smith acted as President. Other members present were: Mr. Philip Ballard, Mr. Alfred Marston, Rev. Thomas West, Mr. Arthur Thompson, Assistant Secretary and Treasurer, and Mr. Nicholls, senior, and Mr. W. H. Nicholls, junior, both visitors and inhabitants of Usk.

No record can be found of the proceedings at Usk beyond the business transacted. Some letters were read with reference to the recent Bye-laws passed at the Annual Meeting, in which alterations were proposed and suggestions given. Action, however, was deferred to a more representative meeting of members.

Rev. T. W. Weare, Hampton Bishop, was elected a member.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, THURSDAY, AUGUST 14TH, 1862.

HOLME LACY, NEAR HEREFORD.

At this meeting the President, Mr. Chandos Wren Hoskyns, presided. There were also present: Messrs. R. Lightbody and R. M. Lingwood, and Rev. Charles Smith, Vice-Presidents; Revs. J. H. Barker, J. F. Crouch (Hon. Sec.), and T. W. Weare; Drs. H. G. Bull and W. L. Gilliland; Messrs. C. T. Bodenham, T. Cam, and Arthur Thompson; and visitors: Mr. Richard Hereford, Mr. Lightbody, junior, Mr. Mason, and Mr. Robertson from Birmingham.

Mr. W. H. Nicholls of Usk was elected a member.

The Officers of the Dudley and Midland Geological and Scientific Society and Field Club were elected Honorary Members.

The offer of presentation of fossils from the Coal Measures by Mr. William Adams of Ebbw Vale was declined with thanks, on the grounds that our Museum was to be a "Local" Museum.

A sum of £15 was voted to provide such cases for the Museum as the specially appointed Committee should deem most suitable.

The subject of the Bye-laws of the suggested following alteration "that every member (other than honorary) not answering the Secretary's circular, or not attending after signifying his intention of so doing, shall be held liable for a proportionate share of any cost incurred for conveyances, dinners, &c.," was referred for reconsideration by Mr. Cocking and Mr. Lightbody.

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Woolhope Naturalists' Field Club.

FOURTH FIELD MEETING, THURSDAY, SEPTEMBER 18TH, 1862.

CHURCH STRETTON.

JOINT MEETING WITH THE DUDLEY AND THE OSWESTRY FIELD CLUBS.

This meeting was well attended. The Dudley FIELD CLUB brought a party of twenty-three, and the Oswestry Naturalists' Field Club brought six members.

Of the Woolhope Club there were present: the two Vice-Presidents, Mr. R. Lightbody and Mr. R. M. Lingwood; Rev. J. F. Crouch, Honorary Secretary; Colonel Colvin, Revs. Thos. Hutchinson, J. De La Touche, J. J. Miller, Rev. W. S. Symonds, President of the Malvern Club; Messrs. Thos. Blashill, J. W. Colvin, H. J. Jenkins, H. Salwey, — Watkins, and Arthur Thompson, Treasurer and Assistant Secretary. Visitors: Rev. A. Pelham and Miss Hodgson.

Amongst the business transacted Mr. Richard Hereford, of the Moor, Hereford, was elected a member.

A letter from Dr. Bull was read, asking for further information for *The Flora of Herefordshire* from the following Districts, from which our information was very deficent, in the order as below: Frome (6), Bromyard (5), Golden Valley (13), Kington (11), and Black Mountains (14). Dr. Bull offered to receive and examine for Mr. Purchas any collections from any of the above Districts.

Dr. Bull asked for authority to proceed with the publication of a Map of the County divided into Botanical Districts, and the General Introduction, &c. £5 was voted for the Lithographic Map.*

The large party divided and took routes as recommended in the programme as follows:—

The route recommended for the Longmynd party was up the "Ashes Valley" from Little Stretton, which gives a fine section, and some of the Arenicolites at Yearling Hill, just before crossing the first side dingle on the right; thence up the Pole Hill, for the extensive view of the surrounding formations, descending to Stretton by the Spout Valley and Carding Mills.

* For the Map, divided into 14 Botanical Districts, see frontispiece, Vol. Transactions, 1866. The Map also forms the frontispiece of "The Flora of Herefordshire," published in 1899.

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The Caradoc party ascending Caer Caradoc, from the summit of which a fine view was obtainable of the three great ridges or beds of the Caradoc, viz., The Hoar Edge, Chatwall, and Gretton Beds, descended and examined the beds as far as the limited time permitted, on their return to Church Stretton.

At 5-0 p.m. dinner (Tickets 3s. each) was partaken of at the Crown Hotel, Church Stretton.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING

THURSDAY, MARCH 12TH, 1863.

The Annual General Meeting was held at the Museum in the Castle Green, Hereford, on Thursday, March 12th, 1863.

Present: Mr. Chandos Wren Hoskyns, President; Members: Dr. Bull, Rev. J. F. Crouch, Hon. Sec., Dr. Gilliland, Mr. R. Lightbody, and Mr. R. M. Lingwood.

The following bills were ordered to be paid:—Mr. Thompson, for Glass Case, £13; for Half-year's Rent of Room, £5.

The proposition from Mr. Cocking before referred to (June 12th, 1862), relating to a suggested alteration of the New Bye-law being considered, it was unanimously decided that the present Laws should still continue in force, with the insertion of the words "within four clear days of the meeting" in the second line after the words "circular" and before the words "shall be presumed," &c.

The Treasurer's account showed a balance in hand at the bank.

Mr. C. Wren Hoskyns was re-elected President for 1863. Mr. Thompson was requested to continue in office as Treasurer and Assistant Secretary. The Museum Committee and the Botanical Sub-Committees were requested to continue their services.

It was resolved that the Field Meetings should be held as follows:—

TUESDAY, JUNE 9TH, MITCHELDEAN ROAD for the SPEECH HOUSE, FOREST OF DEAN.

TUESDAY, JULY 7TH, CRAVEN ARMS.

TUESDAY, AUGUST 11TH, PONTRILAS.*

WEDNESDAY, SEPTEMBER 9TH, for that day and the 10TH, MALVERN, to meet the Malvern and Cotteswold Clubs.†

The President (Mr. Chandos Wren Hoskyns) read an address on the proceedings of the past year, 1862.‡

The Very Rev. the Dean of Hereford, the Rev. Wm. S. Symonds, Captain Guise, and Mr. W. C. Lucy attended the dinner at the Mitre Hotel.

Mr. Symonds gave a very interesting account of the results of their inspection of the Gravel Beds (Railway opening) at Stretton Sugwas.

He was followed by Captain Guise on the subject of Gravel Beds in general.

* Afterwards postponed to August 18th, by a requisition signed by the President and five members.
† This meeting took place at Malvern Link on Monday, September 7th.
‡ This address, apparently, was never published.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, TUESDAY, JUNE 9TH, 1863.

FOREST OF DEAN.

The First Field Meeting in 1863 was held at Mitcheldean Road Station, on Tuesday, June 9th.

The following is taken from the minutes of the Club :—" After a delightful trip to Lea Bailey Hill, part of the Old Limekilns, to a deep trench in which some of the shales and their bands of fossiliferous stone underlying the Carboniferous Limestone are exposed, ... the party proceeded over the hill past Mr. Allaway's Mine Pit at Wigpool, where some specimens of iron ore were procured, past the Wilderness through a portion of the Forest, past Woodside to Cinderford.

" On passing the neighbourhood of one of the numerous Coal-pits, some good specimens of fossil plants were found in the shales.

" The party returned in a carriage from Cinderford to Ross.

The election of Vice-Presidents for the year having been omitted at the Annual Meeting, the following were elected : Dr. G. P. Bevan, Mr. R. Lightbody, Mr. R. M. Lingwood, and Rev. Charles Smith.

Various Officers of the Oswestry and Welshpool Naturalists' Field Club, of the Severn Valley Naturalists' Field Club, and of the Caradoc Field Club were elected honorary members.

Six candidates were elected members.

The following is a list of the party : Mr. Chandos Wren Hoskyns, President ; Mr. R. M. Lingwood and Rev. Charles Smith, Vice-Presidents ; Members : Mr. T. Curley, C.E., Rev. Arthur Gray, Rev. W. H. Purchas, Mr. Alfred Purchas, Mr. Humphrey Salwey, Rev. Thomas West, and Mr. Arthur Thompson, Treasurer and Assistant Secretary.

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, TUESDAY, JULY 7TH, 1863.

CRAVEN ARMS.

JOINT MEETING WITH THE "OSWESTRY AND WELSHPOOL" AND "CARADOC" NATURALISTS' FIELD CLUBS.

At the Second Field Meeting, on July 7th, 1863, the following attended: Mr. Chandos Wren Hoskyns, President; Mr. Robert Lightbody, Mr. R. M. Lingwood, and Rev. Charles Smith, Vice-Presidents; Honorary Members: Mr. George Bentham, President of the Linnean Society, and Captain Guise, President of the Cotteswold Field Club; Members: Messrs. R. W. Banks, Thomas Cam, George Cocking, T. Curley, A. Purchas, Humphrey Salwey, Colonel Colvin, Revs. T. Hutchinson, H. C. Key, J. J. Miller, and Mr. Arthur Thompson, Treasurer and Assistant Secretary. Also the following visitors: The Misses Colvin, Mr. Crouch, Master T. Hutchinson, Rev. John Hanbury, and Miss Hodgson.

The party was joined by the Presidents and Vice-Presidents of the Oswestry and Welshpool, also of the Caradoc Field Club, and other members of each Club.

By permission of Mrs. Stackhouse Acton, Stokesay Castle was visited, its features being described by Rev. J. D. La Touche. The adjoining Church of Stokesay was also visited.

The party divided—one party proceeding up the river Onny by Horderley, to trace the Wenlock, Caradoc, Llandovery, and Longmynd formations, limited by the south-west spire of the Longmynds, a walk of ten miles.

The majority visited a quarry of Lower Ludlow rocks under Stokesay Wood. Ascending the wood to the summit of the hill a rare plant, *Astrantia major*, was found in three different places, also varieties of ferns. Addresses on the Geology of the neighbourhood were given by Rev. J. D. La Touche, and by Mr. Humphrey Salwey.

The Aymestry Quarries at View Edge, or Weo Edge, were also visited.

After dinner at the Craven Arms Hotel, at which seventy-two sat down, addresses were given by the President, by Captain Guise, and by Mr. Thomas Owens.

The Rev. Thos. O. Rocke read a paper on a Tumulus at Clungunford, exhibiting various relics found therein.

Mr. George Bentham gave a short address on "The Distribution of Plants."

Thanks were voted to Rev. E. Jacson for his presentation to the Museum of specimens of Roman Pottery.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, TUESDAY, AUGUST 18TH, 1863.

PONTRILAS.

The Third Field Meeting in 1863 was held at Pontrilas, on Tuesday, August 18th. After examination of the section in the cutting at Pontrilas railway station, the route was taken through lanes and woods to the Eurypterus quarry and other quarries recently opened at Rowlestone, a visit to Rowlestone Church being made in passing.

From Rowlestone the party proceeded to Ewyas Harold, where several fossils were obtained from a massive block which Mr. Smith has raised from a quarry in his field for their inspection.

The thanks of the meeting were voted to Dr. McCullough for his presentation to the Museum of fossils from Abergavenny, which were exhibited by him.

Some of the party visited Abbey Dore Church.* After dinner under a tent at the Temple Bar, Ewyas Harold, the Rev. — Thornton read some interesting passages on the history of Abbey Dore Church.

On return to the station Ewyas Harold Church was inspected.

The following were present at this meeting: Mr. Chandos Wren Hoskyns, President, Dr. G. P. Bevan,, Mr. Robert Lightbody, and Mr. R. M. Lingwood, Vice-Presidents; with the following members: Dr. McCullough, Messrs. C. T. Bodenham, Geo. Cocking, T. Curley, Henry Jenkins, Humphrey Salwey, J. E. Smith, Revs. Arthur Gray and H. J. Hill, and Mr. Arthur Thompson, Treasurer and Assistant Secretary; and visitors: Rev. T. H. Candy of Llangua, Rev. George Cornewall, Mr. — Bosanquet, Rev. C. L. Eagles, Colonel Fielden, of Dulas Court, Rev. A. M. Fielden, Mr. — Jones, Mr. T. Clarence Porter, Mr. — Smith, Rev. — Thornton, and Rev. W. Wenman, of Rowlestone.

* In his retiring address, Mr. Chandos Wren Hoskyns made some remarks on the architectural beauty of Abbey Dore Church.

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Woolhope Naturalists' Field Club.

FOURTH FIELD MEETING, MONDAY, SEPTEMBER 7TH, 1863.

MALVERN LINK.

On 7th September, 1863, the Club met at Malvern Link for a grand Field Day, with the members of the Malvern, Worcestershire, Cotteswold, Dudley, Severn Valley, and Caradoc Clubs.

The members breakfasted at Lyttleton House, Malvern Link, by invitation ot Rev. Thomas King.

The business of the Club consisted in the election of the following candidates: Rev. Thomas H. Candy, Llangua; Rev. George Cornewall, Moccas; Colonel Fielden, Dulas Court; Rev. Berkeley L. S. Stanhope, Bosbury; and Rev. W. Wenman of Rowlestone.

The following attended the meeting: Mr. R. Lightbody and Rev. Charles Smith, Vice-Presidents; Rev. H. C. Key, Rev. Thos. King, Dr. McCullough, Messrs. Philip Baylis, Thos. Blashill, C. T. Bodenham, T. Curley, Elmes Y. Steele, and Arthur Thompson, Treasurer and Assistant Secretary; and the following visitors: Mr. T. T. Davies and Rev. — Mason.

Having partaken of the kind hospitality of the Rev. Thomas King, at Lyttelton House, and transacted the ordinary business of the Club, our members joined the general assemblage in a visit to the very interesting Abbey Church at Great Malvern, which has been recently restored by Mr. Gilbert Scott. A brief history of the Abbey was given by Mr. J. S. Walker, with an explanation of the curious and very old glass in the South West Chapel.

The Museum of the Malvern Club at the house of the Messrs. Burrows was next visited, and after a short inspection of some of the many interesting fossils of the district, which it contains, a general move was made for the summit of the Worcestershire Beacon. From this (the highest point of the Malvern Hills), a most interesting and eloquent lecture was given by the Rev. W. S. Symonds, F.G.S., President of the Malvern Club, on the Geology of the surrounding district. It was thoroughly appreciated by everyone, but enjoyed more especially by those gentlemen who had wisely carried up with them their great coats.

The Geologists, under the guidance of Dr. Holl, then pursued their way across the Llandovery conglomerate of Miss Phillips to the Upper Silurian Rocks,

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and thence by Ham Green, Backburrow Wood, and Stoctons Copse, to the lime-kilns near the Croft Farm, and on down the valley to inspect the trap bosses in Cowleigh Park.

The Botanists present, attracted irresistibly to Mr. Edwin Lees, had a delightful ramble under his special guidance. This district is peculiarly his own. No one knows so well the localities of its rarest plants, and happily no one knows how, with better tact, to guard them from ruthless destruction.

The whole party, some 60 or 70 strong, met to dine at the Link Hotel, and such as could remain for the night were kindly invited by Dr. Grindrod to a soirée at Townshend House, when his fine collection of Silurian fossils was exhibited, and where several interesting papers were afterwards read.

A day on the Malvern Hills—weather propitious—must always be enjoyable, but with Mr. Symonds to descant on the rocks he loves so well, and Mr. Lees to explain all that grows upon their surface—it would be strange indeed if this particular meeting should not ever be of pleasant memory to those who had the good fortune to be present.

Our Club, with the others, may be considered to have been on a visit to the Malvern Club, and it would ill become your Reporter to trespass on the rights of hospitality. To those, therefore, who wish for more exact details of the day's proceedings and the papers read, I must answer, Are they not written in the Archives of the Malvern Club? I don't think much real work was done, and perhaps never is on such grand gatherings. All present most thoroughly enjoyed the day, and returned home with a store of information, and a renewed enthusiasm, let us hope, to carry on the work of observation in their several districts.

I prefer asking you, on the present occasion, to leave Worcestershire, and come with me along the top of the hills to our own Herefordshire Beacon, and descending by the long spur called the "Ridgeway," leading from it to Eastnor Park, to visit the Oak Tree upon which the Mistletoe grows so luxuriantly.*

See "The Mistletoe in Herefordshire," following the President's Address on March 17th, 1864.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING.

THURSDAY, MARCH 17TH, 1864.

The Annual General Meeting was held in the Museum in the Castle Green, Hereford, on Thursday, March 17th, 1864. The following were present: Mr. Chandos Wren Hoskyns, President; Mr. R. M. Lingwood and Rev. Chas. Smith, Vice-Presidents; Rev. J. F. Crouch, Honorary Secretary; Dr. H. G. Bull, Mr. C. T. Bodenham, Mr. Thos. Cam, Mr. T. Curley, Rev. H. C. Key, Rev. Thos. King, Rev. F. Merewether, Rev. W. Wenman, and Mr. Arthur Thompson.

The Assistant Secretary announced that he had received the Meteorological Instruments and Reports from Mr. Glegg Bullock at the Infirmary, and that Mr. Edwin J. Isbell had examined and reported concerning them, and had offered to take charge of them. They are at present in the Museum.

Rev. J. F. Crouch was elected President for the year, and Mr. Thomas Cam, Mr. R. Lightbody, Rev. Chas. Smith, and Mr. Elmes Y. Steele were appointed Vice-Presidents.

Mr. R. M. Lingwood was appointed Honorary Secretary; Mr. Arthur Thompson was re-appointed Treasurer and Assistant Secretary. The sum of £5 was presented to him.

Botanical Committee was constituted of Rev. J. F. Crouch, President, Dr. Bull, Mr. R. M. Lingwood, and Rev. T. H. Lee Warner.

Museum Committee: The Rev. J. F. Crouch, Mr. C. Wren Hoskyns, Mr. R. M. Lingwood, and Mr. Arthur Thompson were requested to continue their services.

The following were elected members of the Club: Mr. Thomas Garrold, Westbank, Hereford; Rev. Robert Hereford, Sufton; Mr. E. J. Isbell, Hereford; Mr. John Edward Lee, The Priory, Caerleon; Mr. Humphrey Mildmay, M.P.; Mr. J. Griffiths Morris, Hereford; and Colonel Scudamore of Kentchurch Court.

The Field Meetings for 1864 were fixed as follows:—

THURSDAY, MAY 26TH, KINGSLAND, to meet the Caradoc Field Club.
TUESDAY, JUNE 21ST, HAY.
WEDNESDAY, JULY 20TH, ROSS, to meet the Cotteswold and Malvern Clubs.*
THURSDAY, AUGUST 18TH, LEDBURY.

* Afterwards altered to Thursday, July 21st.

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Dinner took place at the Mitre Hotel, where the party were joined by the following members: Mr. Thomas Blashill, Rev. J. H. Candy, Rev. Thos. Woodhouse, and the following visitors: Mr. H. Blashill, Rev. E. DuBuisson, Mr. T. W. Garrold, Mr. R. Greenhow, Mr. J. G. Morris, Rev. J. J. Parsons, and Rev. J. Taylor.

The President, Mr. Chandos Wren Hoskyns, read his address as Retiring President for 1864.

The following papers were read:—

On the Forest of Dean Meeting, on Tuesday, June 9th, 1863, by Mr. R. M. Lingwood.

On the Pontrilas Meeting, on August 18th, 1863, prepared by Mr. J. E. Smith, and read by Mr. Lingwood.

On the Malvern Meeting, on September 7th, by Dr. Bull.

On the Earthquake of Tuesday, October 6th, 1863, prepared by Mr. E. J. Isbell, read by H. C. Key.

It was resolved that notice be given to the Herefordshire Philosophical Society of the intention of the Club to give up that portion of the Museum occupied by them on August 1st.

THE ADDRESS

Of the retiring President, C. Wren Hoskyns, Esq., read before the members of the Woolhope Naturalists' Field Club, at their Annual Meeting, held in Hereford, on Thursday, March 17th, 1864.

Gentlemen of the Woolhope Naturalists' Field Club,

I am afraid to say how many years have passed since I was standing one day in a Bookseller's shop in Warwick, when a gentleman, personally unknown to me, came in and took up a pamphlet from the top of a heap fresh from the Printers, which had my own name on the title page, and contained the first year's Transactions of the Naturalists' Field Club of that county.

I experienced a very agreeable sensation on seeing the stranger immediately take out his purse, with the apparent intention of buying it. But Capital is proverbially timid, and self-love liable to disappointment. As he looked closer at the title page I had the mortification to observe that his purse gradually made a retrograde movement towards his pocket; the ungrateful action being accompanied and explained by his utterance of the words, "O, it's only an *Annual* Address!"

As soon as he had left the shop, little aware of the slaughter inflicted upon my hopes in that short pantomime, the publisher, who was himself at the counter, looked across at me with the consolatory smile of

"the fiend who never spoke before,
But cries, 'I warned you,' when the deed is o'er."

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and almost literally recited 'the Fiend's part' by saying to me "I told you, Sir, how it would be if you put 'Annual Address' on the title page!" The incident was instructive.

Nevertheless, owing either to a dearth of disengaged presidential material, or a too easy acquiesence in "the ills they had" in the Club, I still had, for many succeeding years, to encounter the annual experiment of reviewing our pleasant field excursions of the past summer; but always under a somewhat stinging remembrance of the fate that impends over an "Annual Address," and a taste on entering upon the task, of that after instinct which makes a horse shy extempore on approaching the spot where an accident has happened to him; and which you may have often seen exemplified in a certain leading article of *The Times* which appears about quarter-day, in which after enticing the eye through half a column of agreeable preface, the writer lands you high and dry in the statistics of the Registrar General's Quarterly Report of Births, Deaths, and Marriages.

I cannot, however, enter upon the duty of endeavouring to recall the proceedings of the Woolhope Naturalists' Field Club during the past year without indulging a reflection, which occurs to me very strongly, upon the great extension of interest which has taken place in those pursuits which form the out o'door study and objects of Societies like our own, and have led to their increased establishment in the surrounding counties and districts. Nothing, perhaps, in the year has been more remarkable than the evidence of this which it embraces in the growth of these kindred associations around us, and the joint meetings, and augmented interests to which they have from time to time given rise.

Besides the Malvern, the Cotteswold, and the Warwickshire Clubs, which we formerly recognised in the adjoining or neighbouring counties, we have now to welcome the restoration of the Dudley and Midland Geological and Scientific Society, the Severn Valley Field Club, the Oswestry, the Bridgnorth, and the still more recently established Caradoc Club, occupying areas that well deserved the scrutiny of separate Societies, while their establishment has increased the opportunities of mutual acquaintance and united labour amongst the members resident in the different districts.

There can be no doubt that the Geology alone of each of these districts, as now occupied, affords an ample field of operations; and it is impossible to witness the rise of these numerous local societies without being struck by the prospect of the immense accession they promise to the scientific knowledge of the areas they represent, an advantage likely to be rapidly extended to the whole kingdom. I only wish—and I will take the liberty of here expressing it—that some medium more central and comprehensive might be made available than the annual reports of each separate society, for giving to those acquisitions to our knowledge a form more easily accessible, and condensed, such as has suggested itself to me on looking over the various papers that have been printed (to say nothing of those of equal value that have been read but not printed), in the detached form of publication which the nature of the Societies at present necessitates.

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The Clubs that I have named have already a certain bond of union in the reciproçal acceptance of the officers of each as honorary members of all. The path is therefore open for a joint publication of the most valuable discoveries and papers of each Society during the year, which might also include a list of the whole of the places visited by each. The expense of such a publication jointly borne by the associated Societies would be but trifling, while the form of publication would enhance the character of the papers themselves and the importance of the meetings in a general point of view. The very nature of Geological study suggests such a co-operation, because its working out cannot, like the boundaries of a county, be limited by any artificial line, but radiates through and across the districts of several or all; like the medullary rays which traverse the angular rings in the growth of wood, connecting each year's deposit with the *central pith*, and ensuring the united structure and solidity of the whole stem.

But I would not be understood to speak too exclusively of our Geological pursuits, though from its comparative novelty of research, and study, that science has been allowed to occupy a prominent and almost exclusive attention from many of the most active members of these Societies. We can hardly be too often reminded that it is the special privilege of Field Clubs to study the secrets of Nature, not as they are cut up by books into the jealous divisions of distinct 'sciences,' but upon her own broad field where she is all *one*, and, in a certain sense, indivisible, the materials of every science being found in union with all others. It is the limitation of our own faculties, not of anything in Creation itself, which compels separation of pursuits and object, and subdivision, as it were, into chapter and verse. This is more powerfully felt, though insensibly conveyed to us, by one day out of doors, surrounded by men of science (however each may have wisely compressed his studies into one channel), than it ever can be understood from books themselves.

There is, however, one class of out-door investigation which is of course an exception to this remark, and does not strictly fall under the category of science, but for which I would venture to say a word—I mean the study of Archæology—on this ground, that whereas the records afforded by the earth's geological structure are permanent, and its botanical features constantly renewed; those records which tell of the hand of man claim our prompt and early attention on account of the destructive hand of time, and the obliterating effects of the winter's frost and summer's vegetation.

Nature's monuments remain: while those of art follow the perishable hand that reared them, and allow of no delay. The County of Hereford is unfortunate in the want of a completed History; and I confess that I should like to indulge the hope that a Club which is so ubiquitous in its action and operations will not omit to render its out-door labours as much as possible in union with the objects of the Literary and Philosophical Society. "We are a Brotherhood for mutual and self help" says Mr. Hayes in his address this year to the Severn Valley Field Club, "and we should deem it a duty as well as a privilege to contribute to the instruction of others, fully hoping to receive instruction in turn. The

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object should not be to exhibit learning but to gather it and impart it, reciprocally. Each branch of the enquiry should have a fair if not an equal consideration; and the addresses given should be rather those of fellow-students assisting each other, than set lectures *ex cathedrâ*. Much will of course depend on the points of interest existing in the place we visit; but those who plan the day's ramble should remember that all the members have not the same pursuit or object, and that the wants of each branch should be provided for."

I entirely agree with these plain and obvious remarks of my brother President, and can confirm the value of his suggestions from the spontaneous remembrance that occurs to me of the peculiar pleasure of Field Club days and wanderings as arising from the variety, and if I may so say, the flexibility of scientific topics brought together; a pleasure of extreme rarity at scientific meetings in Town and Country; where speciality of subject and treatment is so apt to drift into a monotony and conventionalism of language, and laborious classification, and worse than these, a referential and esoteric style understood only by a small knot of devotees to particular branches of art or study. I merely allude to this subject in passing, because I have in frequent instances found that those who would become valued members of our Society have been deterred by the fear that they were not sufficiently learned in particular Sciences to join us.

Certainly our rambles of the past year would not have left upon the minds, even of the most sensitive in that respect, any such impression. Our First Meeting which took place on the 9th of June, at the Mitcheldean Road Station, near Ross, and led us into the Forest of Dean, formed a most cheerful and agreeable opening of the season. The day was fresh and fine, exactly suited for a long walk, and that we had, passing through some good sections of the Carboniferous Limestone, which were examined at its outcrop, and some of its characteristic fossils obtained. Our walk, which was directed to Cinderford, led us by some newly erected mining works, where Iron Ore has been obtained from the Limestone beds. The last part of our walk, for a couple of miles before we reached Cinderford, was through some very picturesque Forest Scenery, through the openings of the foliage of which the smoke of the town and works of Cinderford "gracefully curled" in a manner more pleasing than on nearer acquaintance. The members had walked quite far enough to enjoy a very primitive luncheon at a small but by no means quiet Inn, which, to misquote Goldsmith,

> "Did seem contrived a double debt to pay,
> An Inn by night, a Butcher's shop by day,"

and adapted rather to test the power of appetite than to satisfy it. On returning past the town some curious sections were noticed of the disturbed Limestone beds thrown into very nearly vertical Strata. On their return the members dined together at Ross.

This little raid into the Forest was such as to make me feel very jealous of a subsequent Forest tour undertaken by our valued Secretary elect, which I hope will, together with a more detailed account of our Club day, form the subject of a paper for this evening.

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The Second Meeting of the Society, which took place on the 7th of July at the Craven Arms, near Ludlow, was one that will be long remembered by those who were present. It was a joint assemblage, in fact, of not less than five Societies, consisting of the Oswestry, the Dudley, the Bridgnorth, and the young and promising Caradoc Club with our own. The place chosen presented several attractions—the Ruins of Stokesay Castle, for the inspection of the Archæologist, the Wood of View Edge, said to be the only place in England where the Astrantia major is supposed to grow wild, of which abundant specimens were found, and to the judgment of some, rather cruelly brought away, suggesting to the mind of our late Secretary the very just remark that "it is not wise to talk too loudly about a *scarce* plant," for several of our number who climed the heights of the wood, in search of it, came out of it with the rare Astrantia ruthlessly torn up, in some cases by the roots, and borne in ruinous triumph on their hats, and other parts of their dress. "I took *two* specimens—for I do not like to *exterminate*"—adds his communication, but if all the septuagint of naturalists assembled on that day were equally forbearing, the exterminating process will hardly have received a very exemplary check.

But the Wood of View Edge contained another attraction in its celebrated Quarry of Aymestry Limestone, where nearly the whole of the rock, exposed to a thickness of from 30 to 40 feet, is composed of Pentamerus Knightii cemented together.

As the very interesting ruin of Stokesay Castle is the subject of a printed account, I will not attempt any extended notice here of its almost indescribably angulated Tower, and its old Court Yard, and very curious and grotesquely carved Gateway. The brief notice of it in Hudson Turner's "Domestic Architecture of the 12th and 13th Centuries" places it in the catalogue of what may be called the classic ruins of our early history. I should be wanting in justice if I did not mention that it owes its preservation, in the existing condition of interest to the Archæologist, entirely to the tasteful interposition of Mrs. Stackhouse Acton, who took a most kind interest in opening it for the scrutinising inspection of the Society, at which she was present during the whole day, affording the aid of her own accomplished archæological experience, towards the explanation of the original plan of the ancient Hall, and other parts of the building. I must add that the presence of Mrs. Acton during the day, and with a large party of ladies of the neighbourhood at the dinner of the Society at the Craven Arms, will be remembered by the members present, of many Clubs, almost as an illustration of what may be done to render these meetings interesting and useful both to the Societies themselves, and to the residents of the districts visited. The dinner was one which furnished very cogent illustrations of the maxim "the more the merrier," the double room of the rather astonished host of the Craven Arms being as full as it could or rather couldn't hold, and something over. Several short but useful papers were read, in the intervals of a rather brisk discussion, chiefly on botanical questions suggested by doubts as to the indigenous character of the Astrantia major.

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On the 2nd of the following month, August, the Club assembled at Pontrilas Station for its Third Meeting, and the members walked, by Ewyas Harold Common, as far as the beautiful vestige of the ancient border Abbey of Dore; of which the historical account (if such it can be called) that we have, is so defective that the detruncated relic (for the nave is gone) remains a perfect mystery of architectural beauty and labour, affording a school of transitional work, of that choice period when the Norman treatment had not disappeared from Early English work, and the latter had not begun to yield to the temptations of the Decorated style: a period, to my mind, the most attractively beautiful, and the most permanently interesting of all that come under the general title of Gothic Architecture. The plain and shallow work of the exterior enhances the surprising beauty of the chisel-work in the groining of the Lady Chapel or Ambulatory which encloses the Chancel, almost the only portion which remains quite entire. Even through the stubborn coat of whitewash, which is half an inch thick, the deep yet delicate work of the artist may be appreciated in all its rich and never self repeating profusion. Scarcely any of the capitals or corbelled projections are alike: indeed, the execution of the groin work of the Ambulatory on the north side is unsurpassed by any work of the kind I have ever seen. To examine it is to wonder more and more, after approaching it over so many miles of bad road, and in so wild a district. To the traveller from the Abbey of Dore to that of Llanthony the world would not appear to have advanced much during the last five centuries. The thanks of all admirers of Architecture are due to the present Vicar, Mr. James, for the labour of love which he has expended, at his own unaided cost, in clearing a considerable portion of the plaster away, and revealing the exquisite work beneath.

The portion of the building now used for worship is disfigured by the wooden fittings of the Transept, which bear the stamp of James the First's time: amongst which is to be classed a curious old Altar monument in the Choir to Serjeant Hoskyns, covered with latin verses by Bonham of Essex, Daniel, Dr. Donne, and others, in the extravagantly laudatory fashion of the day. I trust the time may not be far distant in this Church-restoring day, when this gem-like relic may be wholly relieved of its mask of white-wash, and the unsightly intrusion of its Jacobite wood fittings and pews. After inspecting Dore Abbey and Ewyas Harold Church with its curious Tower, the members dined under canvas, and were joined by the present High Sheriff, and separated after a most interesting day's excursion.

The last meeting of the year, which was a joint assemblage of the Malvern, Worcester, and Cotteswold Clubs with our own, at Malvern, on the 7th of September, I have to express my great regret to have been prevented attending. The Excursion was to the Worcestershire Beacon, where Mr. Symonds, President of the Cotteswold Club, lectured on the Geology of the surrounding country. Dr. Bull has promised to make this meeting the subject of a separate paper to be presently read to you.

I can hardly conclude my address without some reference to a subject which appears to have lately revived much of the same feeling between Science and

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Theology, which those who are old enough to remember it, will call to mind as having characterized the discussions which arose at the infancy of Geological Science in our day—I allude to the subject of Sir Charles Lyell's late work on the Antiquity of Man. The conclusions that have been indicated by men of science and exaggerated (as is often the case) by their followers on this topic, have naturally startled the minds of many by the conflict suggested with some received theological views. I do not think it is sufficiently borne in mind that the whole history of physical science during the last four centuries affords sufficient confirmation of the belief that there is no just cause for the least apprehension on this ground. But this is not all. It is not enough to say that any existing or apparent antagonism between science and religion will die out; this would be the truth, which we often hear: but it is wanting in fairness to science because it is not the whole truth. A reflection, in some respects even more important, may be derived from looking back upon the influence which science—however once shrunk from and dreaded for the conclusions it seemed to threaten—has eventually produced, in its gradual and insensible absorption within the very centre of religious thought and language, enlarging and expanding the views it was once apprehended that it would overturn, and it was at any rate believed to invade. The history of Astronomy in the seventeenth century is apt to be forgotten in this day. But it may be appealed to with advantage as that of a campaign far more fierce and lasting than probably advancing science will ever witness again, and compared with which our disputes are a mere mockery of warfare, and an echo of the fear that once overspread Christendom. Yet who, in the present day, would exchange the chart and title-deeds of Christian faith for those maintained before the progressive hand of science had spread in our view the field of creative wisdom and goodness as it is now understood and appreciated?

Had Wicliffe been asked what he thought of the progress of Physical Science in reference to Revelation, it is possible he would scarcely, if at all, have recognised the pertinence of the question. The very relation between them had not sufficiently awakened to assume the form of antagonism. Of the storm raised in the theological world by the discoveries and doctrines of Copernicus and Galileo, we can scarcely, at this distance of time, form a conception. In the case of Astronomy this storm has long passed away; but it has not left a mere negative atmosphere behind it. As the antagonism with theological *opinion*, mistaken for discrepancy with religious Truth, died away, the *relation that suggested it* survived, and the scientific study of the wonders of Creation was found in powerful alliance with the very truths it had been supposed to threaten. It entered into the very language of religion; it did more, it became a part of religious thought, and practical devotion. It is one of the purest pleasures of a life devoted to scientific pursuits, to mark, when once the true reading of a complicated problem has been obtained, how all the difficulties which had previously blocked up the path like piles of ruin, are one by one cleared away, not by being destroyed, but by being harmonised and reduced to consistency and order. Things which appeared hopelessly antagonistic, are found necessary to the elucidation of each other, and to the comprehension of the whole of which they form a part. And thus from

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what seemed at one time a wild chaos of facts driven about at random by each conflicting current of hypothesis, there emerges at last that compact symmetry and simplicity which we recognise at once as truth. What inward misgiving is it that makes us distrust or despair of this result in Theology? If we could look back to the occurrence of the first great mediæval discoveries in Geography, in Astronomy, even in Literature, we should see convulsion of existing opinion, processes of mental revolution, far greater, for many obvious causes, than any which scientific discovery can cause to-day. Yet the pyramid which seemed to many, perhaps most thinkers of that day, to be trembling on its point ready to topple down upon the next generation, if not their own, still rests upon its base; and to the thinking of most, even of the timid of our day, a good deal more firmly than it did, as it depended on man's previous opinions and creeds. The progress of physical discovery knows no respite, nor pity, for the most persistent theological opposition, any more than the blind forces of nature will pause in obedience to the will of man. But in the progress of time he learns to harness to his own use the very agencies at which his ignorance once trembled, and discovers that Creation is in unison, not in opposition to his wants and happiness, and was framed to be in subservient accordance with that of which it appeared to threaten the very existence.

A heathen writer tells us that the first Mariner was deemed guilty of impiety. We know, from much more recent history, that the first man who used the telescope, the first man who drew lightning from the clouds, nay, the first man who dared to raise the wind artificially to winnow his wheat, was thought little better than an atheist. But nobody now considers Christianity in danger from Lord Rosse's ten-foot Reflector, from the Electric Telegraph, or from Hornsby's Corn-Dressing Machine with its internal hurricane almost enough to blow a man's head off.

In this age, as well as in those before it, we mistake the discordance with our own readings and opinions for opposition to Christian truth. We mistake the ideas we have associated with our religious views, for religion itself. Time, the greatest of revolutionists, insensibly corrects the error, and supplies the reconciliation better than any argument. In matters of science it is far better to keep the work separate at first, to let each investigator go on in his own track undisturbed by perpetual challenge of disagreement with received opinions. The Chinese foot does not become more symmetrical by the attempt to restrain it within the shoe that fitted its infancy; and the Study of Nature, if left unconfined, will best preserve the symmetry of Truth while the proportions of human Thought are enlarged.

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THE MISTLETOE IN HEREFORDSHIRE.

By Dr. Bull.

The Mistletoe in Herefordshire deserves the especial attention of the members of our Club. The Viscum album is indeed so much more common here than in any other county of England, that it may truly be said to be more distinctive of Herefordshire than the apple tree itself. It is not my intention to give the Botanical characteristics of the Mistletoe, which books contain; nor do I propose to give any special description of the graceful elegant plant you all know so well; but I take this opportunity of bringing before your notice some of the chief points of interest with regard to it, which have been more or less overlooked, viz.:—

1st. The Mode of its Propagation and growth:
2nd. The Trees it lives upon in this county:
3rd. The recorded instances of its growth on the Oak in England: and
4th. The Romance of its history as developed in times past and present.

I.—The Propagation and Growth of the Mistletoe.

The mode in which the Mistletoe is propagated has given rise to much discussion.

> "The Naturalists are puzzled to explain
> How trees did first this stranger entertain,
> Whether the busy birds engraft it there,
> Or else some Deity's mysterious care,
> As Druid's thought,"
> or rather *taught*, adds Withering severely.

This plant has long been the object of close observation from the religious veneration in which it was held—Aristotle (*De Gen. Animal. lib.* 1, *c.* 1.) and other of the ancient writers imagine that the seeds will not grow unless passed through the intestines of a bird.

In olden times—long before the birds had cause to dread the invention of gunpowder—the Mistletoe was the chief source of the birdlime which caught them,* and the Mistletoe Thrush (*turdus viscivorus*) in thus making the seed grow, might be said to produce the cause of its own destruction, and hence arose the ancient proverb, "κίχλη χέζει αὐτῇ κακόν."

(*Turdus cacat suum malum*), or, as the old doggrel expresses it,

> "The Thrush when he pollutes the bough
> Sows for himself the seeds of woe."

Baudin, Scaliger, and others, more modern writers, have treated this view as fabulous, but have committed a still greater error themselves in fancying it a

* In Herefordshire and in Italy much birdlime was formerly made from the berries of the Mistletoe.' *London Encyclopædia.*

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mere excrescence from the tree on which it grew. Virgil represents them in the lines:

> "Quale solet sylvis brumali frigore viscum
> Fronde virere nova quod non sua seminat arbor
> Et croceo fœtu teretes circumdere truncos."
>
> (*Æneid lib.* vi. *l.* 205).

and still later it has been supposed that the glutinous berries stick to the beaks of the birds that eat them, and as they clean their beaks on the neighbouring trees their seeds are sown—a view, it is sufficient to say, which supposes that the birds dont't know how to eat the berries they like so much.

There is no longer any question that the natural mode in which the Mistletoe is propagated from one tree to another is that so graphically represented by the ancient observers; and it is a fact that many modern experimentalists succeed so much better in growing the seeds that the birds have thus dropped, that they seek for them, in preference to using seed fresh from the plant itself. It is equally beyond all doubt, however, that fresh seeds will grow without undergoing any such process.

The artificial propagation of the Mistletoe from the natural seeds, on trees adapted to receive the parasite, is by no means difficult in this county with ordinary care. Fasten the seeds of the berries by the glutinous matter surrounding them to the boughs of a crab or an apple tree, or a black poplar, and if they escape destruction from small birds, Sparrows, Bullfinches, or especially Tom-tits, some of them will be sure to germinate and take root. Many persons, however, even here, have found such great difficulty in growing the seeds that the following precise rules for doing so are added. Raise a considerable piece of the bark by a sloping incision, nearly an inch long, on the under side of the branch to be experimented upon: the cut should only be made through the bark itself, and not into the wood of the branch; or, more simply still, a broad notch may be cut in the bark, then having chosen some fine well ripened berries, open the skin of one of them, remove the seeds with great care and place them in the base of the notch thus made, with the embryo directed towards the trunk of the tree, and restore the raised bark over it. In this way it is best secured from the sun and winds that might dry it up; from the rains that might wash it off; and from the birds also. The branch experimented upon should not be less than five feet from the ground.

The seeds of the Mistletoe require to be handled with great delicacy, a light crush will destroy their vitality by injuring the embryo, and the pulp surrounding them is so very glutinous that it is difficult to place them right and keep them there without pressing on the seeds; many experiments have doubtless failed from want of care in this respect. Some persons have used with advantage a covering of moss and bass to protect them still further from injury and to keep them damp. An old tree in a damp situation will render the success of the experiment still more probable.

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The best time for sowing the seed is January or February. The young plant is at first very slow in its growth, and will spend one, and sometimes two years, in the formation of roots only, before sending out any regular stems.

Mistletoe can also be artificially propagated by grafting or budding, and with still greater certainty by inarching, but it is very unnecessary in this county to adopt either of these plans.

The Continental experimentalists do not seem to find much difficulty in making Mistletoe seeds grow. M. Du Hamel made a long series of experiments with regard to its mode of propagation, and succeeded on all trees but the fig, the oak, the hazel, and the juniper. He could always make the seed germinate, even on earthen pots, stones, dead pieces of wood, or even upon the ground, but though the radicles would shoot out freely at first they quickly died, shewing that it was a true parasite and would only grow upon trees.

M. Dutrochet proved by a series of delicate experiments that they do not obey the usual law of plants in germinating, by at once directing their radicles towards the centre of the earth, but always direct them towards the centre of the object against which they are grown. He caused Mistletoe seeds hanging from threads to germinate on all sides of round balls, and in cases even when the ball was of metal, the radicles were directed towards the centre of the ball, and not towards the earth—that is, the seeds beneath the ball directed their radicles upwards, those on the top sent them downwards, and those at the sides horizontally.

Paley, in his Natural Theology, brings forward the Mistletoe as a singular instance of what he terms "compensation" in his argument to prove the design and contrivance of nature, that inasmuch as its seeds could not grow in the earth like those of other plants, nature has provided them with an adhesive property, which no other seeds have, to enable them to stick to the tree on which they do grow.

The following observations on the mode of growth of the young plant are taken from a paper by Dr. John Harley, on the "Parasitism of the Mistletoe," which was read before the Linnæan Society, in March, 1863. This paper contains a very careful and elaborate investigation into the anatomical relation of the Mistletoe to the plants on which it grows, and draws some very interesting conclusions as to their physiological relations to each other.

"The Mistletoe attaches itself to the nourishing plants, by roots, some of which are horizontal and confined to the bark, while the others are contained within the wood. Henslow, Griffith, Unger, Schacht, and Pitra, all agree in the following particulars:—The young plant first sends into the bark of the nourishing plant a single root, sucker, or senker, which, pressing inwards, comes into perpendicular relation to the wood of the nourishing plant, in the cambial layer of which the point rests, and there ceases to grow. In its passage towards the wood, it gives off several horizontal or side roots, which run along the branch in the bark, or upon the surface of the wood. These side roots give origin to perpendicular

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suckers, which come into contact, like the original root, with the surface of the wood." "The wood and bark of the mother plant, in their periodical increase, form layers around the suckers, which grow in exactly the same manner in the cambial stratum" (Pitra) and thus the hardened suckers come to be imbedded in the body of the wood. Dr. Harley goes on to state, amongst many other interesting particulars relating to the growth of the plant, that their perpendicular roots are tapering, diminishing in size from the circumference towards the centre; that there are usually three or four and sometimes five or six such perpendicular roots; that their terminations are always composed of delicate tubular cells joined end to end, and arranged parallel to each other and to the long axis of the root, and that these roots are always arranged strictly parallel to the medullary rays of the nourishing plant. "The young cellular root of viscum may be regarded generally as a prolongation of the central pith of the parasite, and contiguous medullary rays of the nourishing plant are successively confluent with its surface."

Having minutely described the loose porous structure of the stem and base of the Mistletoe, Dr. Harley says "with regard to the direction and arrangement of the roots of the Viscum which lie within the wood, this is determined by the arrangement of the medullary system of the nourishing plant, the roots always lying strictly parallel to the medullary rays;" a conclusion to which he was led by the fact that the Mistletoe and the supporting branch grow at right angles to each other, and that on a transverse section the Mistletoe roots are always shown to be arranged like the radii of a circle from the circumference towards the central pith.

"The horizontal ramifications (side roots) of the base of the Mistletoe have plainly the same structure as the young perpendicular roots. Whichever direction they take, they produce at frequent and pretty regular intervals, other tapering cellular roots which, guided doubtless by the medullary rays of the bark, press towards the surface of the wood and are thus brought in contact with the ends of its medullary rays. They are subsequently found embedded at various depths in the hard wood of the nourishing plant, like the primary roots. These lateral roots also give origin to budlike processes, which, deepening in colour, grow up obliquely through the bark, and appear as little shoots in the chinks, soon developing leaves and stems as a 'separate plant.'—Dr. Harley also gives gives good ground for believing the perpendicular roots penetrate the hard wood by their own growth, in the absorption they occasion in the wood itself, and in the depth to which they enter—a conclusion which all who have made careful sections of the bough with the Mistletoe attached to it, will have no difficulty in believing. It forms another example of the common law in organic life, that when two living structures impinge on each other in a confined space, the one possessing the lowest power of vitality must give way to the other, and here it is the dense wood of the tree that is gradually caused to be absorbed by the pressure of the soft cellular growth of the perpendicular roots of the Mistletoe.

"When the roots of the Viscum album," says Dr. Harley again, "have become fairly infixed into the medullary system of the nourishing plant, their outer

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portions become gradually thickened by the formation of woody layers upon their surfaces. This increase in the lateral dimensions of the root takes place, *pari passu*, with that of the branch upon which it grows; for every layer of wood deposited on the branch, a corresponding one is deposited upon the Mistletoe; and the growth of the two plants proceeding thus uniformly, the concentric rings of the stock pass uninterruptedly into those of the Mistletoe, and the woody layers become co-incident. Whilst the roots thus undergo increase and lignification about their outer portions, their inner extremities which now lie deeply within the hard wood constantly retain their original soft cellular condition; they are in fact to the viscum what the cellular rootlets of terrestrial plants are to them."

II.—THE TREES UPON WHICH THE MISTLETOE GROWS IN HEREFORDSHIRE

so far as I have been able to ascertain them by my own observation, and with the kind assistance of several members of our Club, and others, are as follows; and I give the list, as closely as may be, in the order of the frequency of its occurrence on the trees at this time:—

1st.—THE APPLE TREE, (*Pyrus malus domestica*) general throughout the County.

On the English Poplars:—

2nd.—THE ABELE TREE OR WHITE POPLAR, (*P. alba*;) not common.

3rd.—THE GREY POPLAR, (*P. canescens*;) rare.

4th.—THE ASPEN, (*P. tremula*;) occasionally; and on the following introduced varieties of Poplar.

5th.—THE BLACK POPLAR, (*P. nigra*;) the earliest introduced species; very common.

6th.—THE BLACK ITALIAN POPLAR, (*P. monolifera*;) introduced in 1772, and has now for the last 30 years been substituted by nurserymen for the Canadian Poplar; very freely.

7th.—THE CANADIAN POPLAR, (*P. Canadensis*) formerly much more generally planted than at this time; very common.

8th.—THE ONTARIO POPLAR, (*P. candicans*) a balsam bearing Poplar, introduced from North America in 1772, and now much distributed by Nurserymen; common.

The Mistletoe grows more or less on all these varieties of Poplar. I bracket them together as a class, for in the reports sent to me, no distinction has been made between them, and when the leaves are off the trees it is very difficult to do so.

9th.—ON THE HAWTHORN, (*Cratægus Oxyacantha*) not uncommon throughout the County, where old trees are found. Round Haywood Forest; Belmont; Breinton; Dinedor; Lyde; The Weir, Hereford; Holme Lacy; Harewood Park; Ledbury district; Ross district (Rev. W. H. Purchas); Leominster

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district (Rev. Thomas Hutchinson); Garnons, (Thomas Blashill, jun., Esq.); Croft Ambrey, very abundantly (Rev. Thomas Woodhouse).

10th.—The Crab (*Pyrus malus*), general throughout the County where it is found.

11th.—The Lime Tree (*Tilia Europæa*), Belmont; Lower Bullingham; Cagebrook; Stoke Edith; Whitfield; Ross district (Rev. W. H. Purchas); Yarkhill (Thomas Blashill, jun., Esq.); Wigmore Road, Aymestry, (Rev. Thomas Woodhouse).

12th.—The Maple (*Acer campestre*), Belmont; Vennwood, (three trees); Marden (several trees); Much Dewchurch; Holme Lacy (several trees); Putley near Ledbury (several trees); Garnons (T. Blashill, Esq.); Leominster (Rev. T. Hutchinson).

13th.—The White Flowering Acacia (*Robinia pseudo-Acacia*), Blackmarston; Litley; Belmont (2 trees); Breinton; Lugwardine (several trees); Harewood Park; Brinsop; Garnons (Thomas Blashill, jun., Esq.); Foxley and Kings Meadow, Wigmore (Rev. Thomas Woodhouse).

14th.—The Mountain Ash (*Pyrus Aucuparia*), Aylstone Hill; Stoke Edith; Withington; Sutton Court; Yatton Court, Aymestry (Rev. Thomas Woodhouse); Leominster (Rev. T. Hutchinson); Dormington (Rev. T. Bird); Lyonshall (Rev. J. F. Crouch); "In the vicinity of Ledbury" (Lees' "Botanical Looker out.")

15th.—The Ash (*Fraxinus excelsior*). Beyond the "Three Elms," Hereford, on the Burghill road; near Mr. Hooper's yard, Canon Frome; Abbot's Meadow, Brampton Abbotts; Strangford-on-the-Wye, opposite Fawley; and near Carey Island, Kings Caple (A. Lee, Esq.)

16th.—Common White Willow (*Salix alba.*), over pool in front of Sugwas House; River Lugg, bank opposite Freens Court, Marden; Strangeway Bank, Bodenham; over pool beyond Thruxton; Mathon near Malvern (Mr. Baxter, by Mr. Haywood).

17th.—The Hazel (*Corylus avellana*), near Pope's pool, Putley, Lebdury; Kimbolton (Rev. T. Hutchinson); Swinmore brook-side, opposite Upleadon, Ledbury (P. Ballard, Esq.)

18th.—The Pear Tree (*Pyrus communis*). Orchard behind Graftonbury farm; in the pleasure ground of Graftonbury House; and said also to grow, on reputable authority, on one tree in Mr. Martin's perry orchard at Monkhide, Ledbury; and on one tree at Wigmore.

19th.—The Oak (*Quercus robur*), the Ridgeway drive, Eastnor Park, Ledbury, and Tedstone Delamere, Sapey (Revs. Dr. Cradock and Gregory Smith, M.A.)

20th.—The Alder (*Alnus glutinosa*), banks of Lugg, opposite Lugwardine (two trees).

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21st.—The Round Leaved Sallow (*Salix caprea*), field near Ruckhall Common, Eaton Bishop.

22nd.—The Sycamore (*Acer pseudo-platanus*), in belt of trees by road-side, Sufton Court.

23rd.—The Common Dog Rose (*Rosa Canina*), Vennwood, Bodenham ; on a stem layered in a hedge one foot from the ground.

24th.—The Medlar, (*Mespilus Germanica*), at Easthampton Lodge, Shobdon (Rev. Thomas Woodhouse).

25th.—The Wych Elm (*Ulmus montana*), near Bockleton (Rev. J. Miller, lately deceased, by Rev. Thomas Hutchinson).

(*There is some little doubt whether this example exists in Herefordshire or Worcestershire*).

The Mistletoe also grows spontaneously on the following cultivated trees in this County :—

26th.—The Yellow Horse Chesnut (*Æsculus flava*). In the Rectory Gardens, Stretton Sugwas (Rev. H. C. Key).

27th.—The Pink Horse Chesnut (*Æsculus rubicunda*). In the Gardens of Harewood (Chandos Wren Hoskyns, Esq.)

28th.—On the Western Maple (*Acer occidentalis*). The Lawn, Belmont, Hereford.

29th.—On the Eastern Maple (*Acer orientalis*). The Island of Belmont Pool, Hereford.

30th.—The American Crab (*Pyrus malus Americanus*). Mr. Godsall's Nursery Ground, Hereford.

The favourite site of the Mistletoe is certainly the Apple Tree. There is scarcely an orchard of any standing in the county without it, and in many it grows far too luxuriantly. The proportion of Apple trees which bear Mistletoe in the central districts of the County, as obtained by a separate examination of more than two thousand trees, as they came, in several orchards, is as follows: in orchards of comparatively new kinds of fruits, principally French and Italian Apples, the average number of trees which bore mistletoe ranged from 13 to about 30 per cent ; in old long established orchards the proportion varied from 30, to as high as 90 per cent. ; whilst the general average from all the trees marked down was 39 per cent. of Mistletoe bearing trees. The actual numbers were 784 with Mistletoe, and 1218 without it. Nor can this very high average be an over statement ; for the trees were examined in March and April, after they had supplied the Christmas and New year's day requirements for this and other Counties, and had been subjected moreover, to the usual annual pruning.

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Mr. Adams, of Marden, who kindly undertook to obtain for me a fair reliable average of the number of Apple trees in full vigour, which bear Mistletoe in that district, has sent me the following result of his examination of all the trees in six different orchards. Mr. Adams was oareful to select orchards in which the trees had attained their full growth and were in full bearing—avoiding on the one hand, orchards of very young trees, where comparatively few were affected by the parasite, and on the other, those containing very old trees, where almost all of them bear Mistletoe.

ORCHARDS.	Trees with Mistletoe.	Trees without Mistletoe.	Average percentage of Mistletoe bearing trees.
No. 1, containing 120 trees, chiefly cider fruits.	40	80	or 33 per cent.
No. 2, with 225 trees cider fruits.	71	154	or 32 per cent.
No. 3, containing 80 trees, $\frac{4}{5}$ cider, $\frac{1}{5}$ pot fruits.	41	39	or 51 per cent.
No. 4, with 41 trees in a damp and sheltered situation, mostly choice hoarding fruits of the old sorts.	34	7	of 83 per cent.
No. 5, with 48 trees, cider fruits.	10	38	or 21 per cent.
No. 6, with 76 trees, chiefly French fruits.	6	70	or 8 per cent.
Total 590 trees.	202	388	or 34 per cent on the general average.

It is the general belief amongst orchard proprietors that the Mistletoe, when in moderation, injures neither the tree itself nor the fruit it bears, as used formerly to be thought. It is not therefore pruned out so much as would otherwise be the case. Mr. Edwin Lees in his "Botanical Looker Out," goes further, indeed, and thinks that the tendency in apple trees to form knots in the wood arises from over-abundance of sap, and that the Mistletoe relieves the tree, as cupping would do: a view so unphysiological, that I prefer to look for the true explanation in the opinion of Dr. Harley, that the presence of the Mistletoe causes an increased quantity of sap to be drawn up for its supply from the soil, and thus the tree would not be much injured, so long as the soil was not exhausted.

Whether the Viscum album shews any preference for any particular sorts of Apples, is a point requiring further investigation. There are certainly some

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facts which seem to shew that this is the case. Some observers, with much orchard experience, think it likes best the more acid kinds of fruit, as the varieties of the Crab, the "old Bromley," "Skyrme's kernel," "Hampton's delight," &c., &c., and is much less common on the "Bitter-sweet," the "Royal Wilding," Norman, French, and Italian fruits, and on "pot fruits" in general. Mr. Adams has observed, that trees bearing white-fleshed apples are much more liable to be attacked by Mistletoe, than those which bear yellow-fleshed apples: The former correspond to the acid fruits, whilst the latter embraces nearly the whole of the new, and French fruits of recent introduction, called Bitter-sweet apples, and from which the best and mildest cider is made.

I have myself observed in some orchards I chance to know well, that there is scarcely a tree of the "Foxwhelp," "Old Cowarne red," or Cowarne Queening, or Quining, that is not inhabited by the Mistletoe, and it signifies not whether the tree may be old or young. This has been confirmed by several close observers, who have also added that it is the same also with the "Redstreak," the "Old Styre," the "Garter apple," the "Woodcock," and indeed with almost all the old Herefordshire apples. It is the general opinion, that Mistletoe is much less common in the orchards of the French, Norman, and Italian fruits lately so much planted: even here though, the viscum seems to make a selection, and will attack young trees of the "upright Normandy," and "Italian apple."—It may be perhaps that as most of the old sorts of apples named are rapidly dying out, (and the two last, though recently introduced, may belong to the same category) this parasite, following the example of parasites in general, as well animal as vegetable, takes advantage of weakness, and thrives best, where it finds the least power of resistance. This view moreover, is supported by the general observation of its greater frequency on old and cankered trees, or on those growing badly from want of drainage, or from some other cause. It is not by any means the case, however, that all weak and decaying trees are attacked in orchards with plenty of Mistletoe in them; so that from the trees it will attack when young and strong on one side, and those that resist it when weak and old on the other, there seems a promising field for careful observation. Whoever may enter it, to find the secret for the requirements for Mistletoe life, or Mistletoe predilections, will have in the first place to master the confusion that prevails amongst the Apple trees themselves, and the ignorance of their owners, as to their right names and virtues, and sorts, and kinds, always excepting, however, the knowledge of the quality of the cider they will make. *

Next to the Apple tree, the Mistletoe certainly likes best the quick-growing Poplars, taken generally as a class, and in particular the Black Italian, Canadian,

* In many a Herefordshire Orchard, may be seen an old cankered tree or two, past bearing fruit, or nearly so; with most of its main branches dead, and what little remains of the tree, overpowered with Mistletoe. A stranger passing by might take such trees as the groundwork for some slashing remarks on the slovenliness of Herefordshire farmers in general. If his good fortune should afterwards bring him within reach of the hospitality of the house, he will very probably, as he walks round the homestead after luncheon, be shown these very dilapidated remains of trees, as the "pets" of the orchard. "That cider you thought so strong and good, grew on these trees 15 years ago"; or they are some old favourite kind that grew the strongest cider in days gone by; or made some wonderful quality in some particular year; or they were "my father's favourite trees, and will bide my time, I hope." Anyway, he will discover that Herefordshire farmers can have amiable reasons for preserving old worn-out apple trees, and will be more cautious in criticism for the future.

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and Ontario varieties. Here its luxuriant branches thrust themselves into notice, as well by their contrast to the tree itself, as by their lofty situation. These trees are now very much planted throughout the country, and no sooner do they attain any size, than a number of them are sure to become inhabited by the Mistletoe. In the central parts of the county the proportion of trees which bear the Viscum may be said to vary from 10 to 30 per cent. according to the age and position of the trees; but in some districts, and in some isolated groups of trees, they probably reach a still higher average. On the upright Lombardy Poplar (*Populus fastigiata*), on the contrary, there is no recorded instance of its growth in this county, nor in England, that I am aware of, although examples have been occasionally found on the Continent.

On the Hawthorn the growth of Mistletoe is widely extended through the county, though it is much more common in some districts than in others. Mr. Edwin Lees has observed the Mistletoe to grow on Thorns, in lines extending across the country, which he accounts for by the long observed fact of the Field-fares and Thrushes flying across the country in direct lines: * Thorns within the line are numerously affected, whilst the Oaks and such uncongenial trees seem passed over, and the Thorns out of this line are also comparatively free.

On the Lime Tree, the Maple, the White Flowering Acacia, and the Mountain Ash, the Mistletoe is not uncommonly observed—considering the number of trees the Maple does not seem to bear Mistletoe so frequently here as in some other districts; but the Mountain Ash seems a favorite site for it, though this tree is not very common in the County.

It is singular that its growth on the Pear tree should be so very uncommon. In many works of reference this tree is placed next to the Apple, as a Mistletoe-bearing tree, but in this County it is extremely rare to find it. Mixed up together so commonly, as these trees are here, the absence of the Mistletoe upon it is very marked. At the present time, after very extended enquiries—enquiries which must have caused some thousands of trees to be examined—the only instances of its occurrence in this County are on two trees at Graftonbury, one an old tree loaded and almost killed by it, in the orchard by the fold-yard, at Graftonbury farm, and the other a younger tree, in the pleasure ground of Graftonbury House also bears a large bunch of Mistletoe; and on authority which I have no reason to doubt, it is said to grow on one tree in Mr. Martin's Perry-orchard at Monkhide, near Ledbury—the only example to be heard of in this great perry district of the County—and lastly, it is also said to grow at Wigmore, in five or six places, on one pear tree.

On all other trees it is certainly rare. Besides the recorded instance of the growth of the Mistletoe on the Wild-rose, it formerly grew spontaneously on a briar, with an engrafted rose, in the garden of Thomas Cam, Esq., one of our members, for many years, but was destroyed in 1860 to make way for improve-

* "When the Velts fly from North to South, it will be a hard winter," they say in Worcestershire, "but if they fly in the reverse direction it will be a mild one." The same thing is said inreference to wild geese and ducks. (Mr. J. S. Haywood, Worcester.)

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ments; and I have also heard of another example of its growing wild on the briar in this County at Westhide, which was unfortunately destroyed some time since.

There is but little doubt that the list of trees which the Mistletoe occasionally inhabits in Herefordshire may, and will be extended by more general and careful observation. The Viscum album is by no means particular in its selection of a home. I will briefly notice all the other trees upon which it has been observed to grow in England so far as I have been able to ascertain:

31st.—The White Beam (*Pyrus Aria*), "On the rocks near the western portal of Chepstow Castle is a fine tree with much Mistletoe upon it." Lees' "Botanical Looker Out"; and at Cobham in Kent. (Jesse.)

32nd.—The Buck-thorn (*Rhamnus catharticus*), named in a paper of Thomas Willisels in the Philosophical letters of Mr. Ray and friends. (N. & Q. Vol. iii., p. 396.)

33rd.—The Laburnum (*Cytisus Laburnum*), at Hampton Court Gardens; and the Slopes, Windsor Park. (Jesse.)

34th.—The Red Swamp Maple (*Acer rubrum*), near the ranger's house, Bushy Park. (Jesse.)

35th.—The Horse Chesnut (*Œsculus hippocastanum*), in Bushy Park, Middlesex. (Jesse.)

36th.—The Filbert.—(*Corylus avellana alba*), at Wigmore, Bishop's Cleeve. (Mr. J. S. Haywood.)

37th.—The Catalpa (*Catalpa syringæfolia*), in Kent. (The Rev. Gerard Smith.)

38th.—The English Elm (*Ulmus campestris*), at Longdon near Upton-on-Severn (Rev. W. S. Symonds) at Bushy Park Farm, near Tewkesbury, ("Botanical Looker-out") Monmouthshire, (The Rev. J. Hibbert) and at Strensham Court, Worcestershire. (Mr. Taylor, in Jesse.)

39th.—The Gooseberry (*Ribes grossularia*), on some large old Gooseberry bushes, Maidstone, Kent. (Journal of Horticulture, December 1863.)

40th.—The Plane Tree (*Platanus occidentalis*), at Wick, near Worcester. (Mr. J. S. Haywood.)

41st.—The Yew Tree (*Taxus semper-virens*), near Sheffield, "on a venerable tree of many centuries growth." (W. S. Sheffield, N. & Q. Vol. vii., p. 199.)

42nd.—The Cedar (*Cedrus Libani*), in Somersetshire. (W. C. Trevelyan, N. & Q. Vol. vi., p. 249.)

43rd.—The Larch Fir (*Abies Larix*), plentifully at Cold Weston, Shropshire. (Jesse.)

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The Mistletoe has never been observed to occur spontaneously in England, so far as I am aware, on any of the following trees, although it has been successfully propagated on several of them :—

The Beech (*Fagus sylvestris*),
The Birch (*Betula alba*),
The Bird Cherry (*Prunus Padus*),
The Wild Cherry (*P. avium*),
The Sloe Tree, or Blackthorn (*P. spinosa*),

nor on any of the cultivated cherry or plum trees.

The Hornbeam (*Carpinus Betulus*),
The Elder (*Sambucus nigra*),
The Holly (*Ilex Europæa*),
The Dogwood (*Cornus sanguineus*),
The Box Tree (*Buxus semper-virens*),

nor has the Mistletoe been observed on any of the following trees naturalised here :—

The Lombardy Poplar (*Populus fastigiata*),
The Sweet Chesnut (*Castanea vesca*),
The Walnut (*Juglans regia*),
The Laurel (*Cerasus Colchicum*),

nor on any of the other many introduced varieties of trees and evergreens.

Why the Mistletoe should attach itself to certain trees in preference to others, is a mystery not yet fully solved. Common observation always refers to it some peculiarity in the bark, and seems, oddly enough, pretty equally divided in opinion as to whether the Viscum prefers a smooth and hard bark, or one that is rough and porous. Dr. Harley from his observations, was led to suppose, "that a difference in size, number, and arrangement of the medullary rays might explain it, and serve to determine, in any given case, the attachment of the Mistletoe ;" and he, accordingly, guided by their minute anatomical structure, has arranged a list of thirty trees in the supposed order of their liability to become the site of the parasite.—On dividing the list into three groups, the ten trees most predisposed to bear Mistletoe—and in the order in which they stand,—are stated to be :—

The Vine Maple Walnut Elder Holly Plum Acacia Cherry Laurel Portugal Laurel Plum	All these trees are common in this County, and yet it is only found on the Maple and the Acacia.

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The middle group, or those only moderately liable from their structure to bear Mistletoe are thus given :—

The Hawthorn Apple and Crab Almond Medlar Lime Olive Ash Poplar Willow Alder	This group contains all the chief Mistletoe-bearing trees, and mixed with them at least three kinds—the Alder, the Willow, and the Ash—upon which it but rarely occurs spontaneously.

The group least liable to become affected by the parasite, is framed as follows :—

The Pear Elm and Birch Fir Larch Lilac Oak Beach Spanish Chesnut Hazel Horse Chesnut	The Mistletoe is found in this County on three of these trees—and on the Hazel, at least three instances are known, inconspicuous as it is on this tree.

It is very clear then, that there must be some predisposition of a kind which this list does not represent and which has yet to be discovered.

Mr. Buckmann, late Professor at the College of Cirencester, gives the following table of the comparative frequency with which trees are prone to bear Mistletoe :—The various kinds of Apple, 25 : Poplar, mostly black, 20 : White-thorn, 10 : Lime, 4 : Maple, 3 : Wlilow, 2 : Oak, 1 : Sycamore, 1 : Acacia, 1 : (N. & Q. Vol. iii, p. 226.) In Herefordshire, the proportion for the Apple tree must certainly be raised considerably, and the Acacia also must be put higher on the list.

It is a remarkable fact that, when the Mistletoe has once established itself on any kind of tree—and the rule holds equally good for those it seldom inhabits—it frequently grows in several branches at the same time, as if the tree no longer possessed its original power of resisting the intruder. The tree shews it too, and soon puts on a desolate woe-begone look, with fading leaves, and dying branches. It is thought that the Limes in this condition in Datchet Mead—a place often mentioned in the " Merry Wives of Windsor,"—gave Shakespeare the illustration embodied in these lines :—

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"Have I not reason to look pale?
These two have 'ticed me to this place;
A barren, detested vale you see it is:
The trees, though Summer, yet forlorn and lean,
O'ercome with moss, and baleful Mistletoe."

(*Tit. And. Act II., sc.* 3.)

Dr. Harley has so well described the effects of the Mistletoe on the supporting branch, and the struggle for life between them, that I must again make a free extract from his interesting paper. "The roots of the Mistletoe stand to the nourishing plant in the relation of a hypertrophied (increased) medullary system and one which induces an excessive flow of sap to the branch, resulting at first in the local hypertrophy (thickening) of its tissues, but subsequently the supply of sap, or the power of transmitting it, failing, the central portion of the wood becomes exhausted and dies, involving in its death that of the destroyer also. The branch, however, still maintains its vigour, and slowly buries the inveterate intruder by its subsequent growth. But other roots are meanwhile penetrating the newly formed layers of wood, and its whole circumference is in time more thickly beset with parasites than ever. The branch is heaved out into a spindle-shaped swelling, and the outer layers of the bark are rent into wide branches favourable to the continued encroachments of the invading parasite, while its inner layers become immensely thickened, and form a suitable nidus for its increase. After a while the second crop of roots spread destruction still further outwards, and like the former crop, implicate themselves in it. The branch still struggles vigorously with its enemy, but as fast as one generation of roots is dying, a later and more numerous progeny attack it. The affected branch moreover assumes various contortions, being twisted sometimes in one direction, and sometimes in another; it is frequently found bent at right angles to itself. But it wrestles in vain with a veritable hydra which, having killed its centre, spoiled, and occupied its bark, and invaded anew the living wood that remains, now gradually completes the work of destruction." An excellent example of this struggle, as here pictured, is to be seen in a Lime tree at Yarkhill,—a thoroughly Mistletoe-possessed tree, its branches all knotted and dying but yet sending off fresh shoots at all angles below the knots, in the vain effort to overcome the enemy; and in other trees in a lesser degree too numerous to mention.

III.—The Occurrence of the Mistletoe on the Oak.

The Viscum album but rarely "gains a settlement" on the Oak tree—as seldom in our own day as in the Druidical times of old, when its very rarity heightened the veneration with which it was regarded when found. "Est autem id varum admodum inventum, et repertum magnâ religione petitur" says Pliny in his natural History. (lib. xvi, c. 44.) In an excellent note by Dr. Giles in his translation of "Richard of Cirencester," (p. 432) he gives the opinion of Dr. Daubeny, that Mistletoe-growing oaks were exterminated after the Druids were destroyed. (N. & Q., Vol. ii.) It is highly probable that this was the case, but since all their oaks too have been gone centuries since, it can make no difference as

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to its occurrence at the present time. Whatever may be the conditions necessary for the germination and growth of the Mistletoe on the oak, they must be such as rarely coincide, or it certainly would be much more common in this County. Oak may be considered the weed of Herefordshire. Oak timber and Oak bark form two of our chief exports. Oak woods and Oak trees border Mistletoe-abounding orchards very generally, and the trees themselves are often mingled in very close alliance: indeed it would not be too much to say, from the great abundance of Oaks in the vicinity of orchards, that the birds must sow the Mistletoe seeds upon them more frequently than upon any other kind of tree in the County. Nevertheless so far as is known, there are but two instances of its growth on the Oak in Herefordshire, the one in Eastnor Park, which has been so well known for many years, and the other in an outlying district of the County at Tedstone Delamere, discovered by Dr. Cradock in 1857.

The occurrence of the Mistletoe on the Oak is at once so rare and so interesting, that I have not confined myself to this County in my enquiries about it, but have taken some pains to ascertain its existence, at the present time, in all the instances which have been recorded as occurring in England. The following instances I have been able to get well authenticated:—

No. 1. The Oak at Eastnor.—Ten days since I visited this Mistletoe-bearing Oak. It is situated the left side of the drive leading from the Park up the Ridgeway hill towards Malvern, about two hundred yards beyond the Lodge. The Oak may be some 80 or 90 years old and the Mistletoe grows freely upon it. It is most luxuriant high up in the tree where three large branches grow very near each other, having in each instance destroyed the bough beyond the place where it is situated. It is also growing in four other places in the tree, one fresh yearling plant shooting straight out from the main stem of the tree about twelve feet from the ground. One large bunch of Mistletoe growing in a large branch many feet from the main stem was dead and decaying, but without having killed the branch. The Mistletoe plants are of both sexes, and the females bear berries freely. It is more slender and pendulous, with smaller and thinner leaves; or in other words, it is not so stiff and rigid, and short jointed, as it usually is when growing on the Apple tree. During the twelve years I have known this tree the Mistletoe has increased upon it, and the Oak is already beginning to shew signs of suffering severely from the parasite. Upon the large moss-covered branches it was curious to observe the great number of Mistletoe seeds which had been deposited by the birds.

No. 2. The Oak at Tedstone Delamere.—In 1853, Dr. Cradock, (Principal of Brazenose College) discovered the Mistletoe growing on a thriving Oak in the parish of Tedstone Delamere. It had been known for some time before by a woodman who kept it a secret but occasionally produced a piece of it on particular occasions. The Incumbent of the Parish at this time, The Rev. Gregory Smith, M.A., has kindly sent me the following description of its present appearance: "The Mistletoe is still growing where Dr. Cradock observed it, on an Oak some 60 years old, and there it has been, according to the Woodman, for some

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30 years or more. The Mistletoe grows in one bunch of five stems from the trunk of the tree about 50 feet from the ground." It does not bear berries although from the small portion Mr. Smith was good enough to inclose, it is a female plant.*

No. 3. On a Fine Oak at Badams Court, Sedbury Park, near Chepstow, the Mistletoe is also now growing luxuriantly :—G. Ormerod, Esq., has kindly forwarded the following description of its condition at this time. "The Mistletoe is still growing on an Oak here, the tree is about 85 years old, and situated on the northern mound of Badams Court, once a moated mansion of the Herberts, or Ap Adams of Beachly and Llanllowel, but now forming part of the Sedbury Park estate. There is only one branch of Mistletoe on the tree, but it has become very luxuriant and has now a diameter of at least three feet. It is more thin and straggling in its growth than it usually is on the apple tree, though it is very healthy and bears berries freely. It grows from the side of a large branch some yards from the main stem of the tree and about 20 feet from the ground. The Oak itself is healthy and vigorous, and does not seem to be injured by the parasite." (April 5th, 1864.)

No. 4. The Mistletoe is also now growing on an Oak at Burningfold Farm, Dunsfold, Surrey.—The Proprietor of the Estate, W. Layland Woods, Esq., has been good enough to send me the account of its present condition. "The Mistletoe at Burningfold grows on an Oak, not less than 150 years old. The tree is more upright than spreading, and the branch grows on the side of an upright limb at about 50 feet from the ground. There is only one branch on the tree, it has grown there for many years, but in January 1849, it was broken very severely by a high wind. However, it flourished afterwards better than before; it is nearly three feet long, of a pendulous nature, not growing so rigid as Mistletoe usually does. During the past summer a sparrow built her nest in the midst of the bunch. It does not injure the tree at present, but has in fact been the means of its preservation, for the Mistletoe branch saved the tree from the axe some years ago. The Oak grows alone in a piece of pasture, but another which formerly stood near it has spoilt the beauty of the tree. The soil in the district is the weald clay of Surrey and Sussex where the Oak used to flourish and abound." (April 19th, 1864).

No. 5. On an Oak in Hackwood Park, near Basingstoke, Mistletoe has long been known to grow.—C. Hooper, Esq., of Eastrop House, Basingstoke, has very kindly obtained for me the following account of this tree. "The first Lord Bolton, [grandfather of the present Lord] sent a specimen of the Mistletoe from this tree to Sir Joseph Banks, who gave an account of it in the Philosophical Transactions. The Oak is still a fine large tree, but evidently very old and reduced in size from what it formerly was, but whether this is from the presence of the Mistletoe, or from storms, it is difficult to say. The Mistletoe grows near the middle of the tree at a considerable height from the ground and in several places among the branches." [April 28th, 1864].—Mr. Hooper had not seen the tree

* I have since learnt that there is but little Mistletoe in the neighbourhood of the tree. The nearest Mistletoe-bearing tree is a *Pear tree*, about 100 yards from the Oak; and this in itself, as we have seen, is an example of *rare* occurrence.

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himself, but described it from a sketch which had been shewn to him by Mr. Hill, of Basingstoke.

No. 6. THE PLYMOUTH OAK.—On recent authority, that of Mr. Edwin Lees, as quoted by Mr. T. W. Giping in the Phytologist [vol. i. p. 151.] it grows in an Oak tree not far from Plymouth by the side of the South Devon Railway. A single bush grows in the topmost branches of a scraggy Oak tree. It is the first wood that occurs by railway north of Plymouth and two or three miles distant from that town. I am unable to state whether this Oak is still in existence with the Mistletoe upon it. The authority for it however, is so good and so recent, that I am prepared to have faith in it.

These are all the instances of the growth of the Viscum album on the Oak that I have been able to authenticate, or believe in, as existing at the present time. I fully thought to have been able to give some examples of Mistletoe Oaks in this paper, which had not been recorded before, but one after the other, they have all failed me, and I have had, on the contrary, to reduce those before known to this small number.

I will now notice all the other instances which I have found recorded in books, and shall be able to shew that most of them have ceased to exist either from the removal of the Oaks, or the death of the Mistletoe in them.—The Frampton Mistletoe-bearing Oak, as one of the most recently discovered, shall head the list.

In the third volume of Notes and Queries, Mr. BUCKMAN states that Mr. Baker, the then President of the Cotteswold Field Club, and himself, were taken by Mr. Clifford, to see an Oak near Frampton-on-Severn, in which Mistletoe was growing.

No. 7.—"The tree was a century old, and the branch, with a good bunch of Mistletoe on it, was about forty years old." This example no longer exists. In answer to a letter of enquiry about it, Mr. Clifford of Frampton Court has politely written to say: "A large party of us went to examine the Mistletoe Oak yesterday, and were sorry to find, that the branch of the tree on which it grew was decayed, and the Mistletoe dead. The tenant intends to observe whether the Mistletoe grows again upon it." [April 19th, 1864].*

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* Mr. Clifford wrote again in 1866 that the Mistletoe had shot out from the trunk of the tree at the base of the dead bough.

A FEW SUBSEQUENT RECORDS.

No. 8. THE MISTLETOE OAK IN DEERFOLD FOREST, HEREFORDSHIRE, was discovered in 1869. See *Transactions* of the Woolhope Naturalists' Field Club, 1869, p. 15, where it is illustrated.

No. 9. ON AN OAK AT THE HENDRE, LLANGATTOCK, NEAR USK. See illustrations in *Transactions*, 1870, p. 68

No. 10. ON AN OAK AT MOCCAS, NEAR HEREFORD, half a mile west of Moccas Park. Discovered by Sir George Cornewall. *Transactions*, 1870, p. 317.

No. 11. ON AN OAK ON THE MOCCAS ESTATE, on the west of Woodbury Hill; also discovered by Sir George Cornewall. *Transactions*, 1903, p. 104.

Since the date of this paper doubtless numerous other records have been found.—EDITOR, 1907.]

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JESSE in his "Scenes and Tales of Country Life" [1844] states that Mistletoe then grew on an Oak, near Godalming in Surrey; at St. Dials, near Monmouth; near Usk; and also at Penporthlenny, Goitre, Monmouthshire. I have been unable to learn the fate of the Godalming Oak, but through enquiries which have been made for me with great diligence and perseverance, I am able to state positively that the Mistletoe-bearing Oaks in the three Monmouthshire localities named, no longer exist. "The Oak at St. Dials which bore Mistletoe, was cut down by the bailiff about twelve years since, and the owner of the estate, Sir Lionel Pilkington, dismissed him immediately for doing so." The Mistletoe Oak near Usk, can be heard of up to five years since, and shortly afterwards it is reported to have been cut down with its neighbours. The loss of the Goitre example, is thus sadly accounted for by a gentleman who kindly wrote about it—"I remember about 25 years ago there was a very large bush of Mistletoe growing in an Oak in the parish of Goitre, but it was most sacrilegiously cut down and hung up over the President's chair at the Cymrygyddian held at Abergavenny. I saw it there myself as, no doubt, hundreds of others did also.' '[J. M. N., April 19th, 1864.]

In 1817, Mr. DICKSON, at the Linnæan Society, stated that he had seen Mistletoe growing in an Oak four miles from Maidstone, by the side of the Medway, but since this has never been recently confirmed, it has most probably ceased to exist.

The late Mr. LOUDON, also, was shewn it in an Oak on the estate of the late Miss Woods of Shopwyke, near Chichester, but this tree can no longer be heard of. It has doubtless passed away with its observer, and the proprietor of the land it grew upon.

Mr. Dovaston, in Loudon's Magazine of Natural History, (Vol. v. p. 203) says he saw it at the Marquis of Anglesea's Park, at Plas Newydd, Isle of Anglesea, "hanging almost over a very grand Druidical cromlech." (Lees' "Botanical Looker Out"): but this not only wants recent confirmation, but is indeed denied by the statement in the same book, that Mistletoe is not now to be found on the Island.

The following examples are interesting, though they have never been publicly recorded, nor are they any longer in existence:—

The late Sir HUNGERFORD HOSKYNS, Bart., of Harewood, in this County, saw the Mistletoe growing on an Oak in the parish of St. Margarets, near Moorhampton, and used to tell the anecdote that when staying at Moccas, he mentioned the fact to Sir George Cornewall Bart.,, who would not believe it. As usual, in those days, a wager was to decide the point, and the next morning, both gentlemen rode off to the tree. Since Sir George paid the £10 we may be quite sure the Mistletoe was there upon the Oak, though it has never since been heard of.

It formerly grew on an Oak in Rockingham Forest, near Moorshay Lawn, Northamptonshire, where the tree was notched for the convenience of climbing up to get the Mistletoe. (J. Percival Smith, Esq.)

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It grew some years since on the lower bough of an Oak in the Vale of Neath, Glamorganshire, about two miles below Aberpergwm House, but the Oak was afterwards blown down in a storm.

It grew on an Oak at Mersham Hatch near Ashford, Kent, where the tree was cut down: it grew on another Oak, at Ledbury, which was also cut down accidentally: and it also has grown upon several other Oaks, if the most positive statements of trustworthy intelligent people are to be relied on; but it is unnecessary now to mention them further, since they have never been noticed publicly, and are admitted no longer to exist.

Mr. EDWIN LEES (Phytologist 1851, p. 357) thinks "that Mistletoe occurs much more frequently on the Oak than is generally imagined, but that the instances are not made known." The present enquiry about it, gives a result precisely the reverse. The belief in its frequent occurrence is very general, it is the fact that fails. Many persons have seen it, and are sure of it, but no one can show the tree with the Mistletoe on it. Time after time have I followed up the most precise statements to my repeated disappointment. "The Mistletoe on the Oak, writes an energetic searcher for it in Monmouthshire, is like a ghost, it vanishes into thin air when you try to grasp it; everybody has seen it long ago, but the tree is always cut down, or somehow or other the result is—*nil.*"—Most woodwards will tell you, and in good faith too, that they have seen it, and indeed will generally mention the exact tree, and the place where it grows, but the result of their further examination has always been the same: for some cause or other, the instance fails, and the Mistletoe can never be shewn on the Oak. The tree has been felled, or blown down, or it may be, the isolated bunch of wild ivy, or honeysuckle which deceived them, is revealed now the leaves are off the trees. Or perchance, where nothing is found, as most frequently happens, they have been misled by a cluster of small twigs from the Oak branch itself, and indeed, at certain periods of the year they do resemble Mistletoe more closely than would be credited by those who have not closely observed them. In some instances the mistake has arisen from one tree being intermingled with another, the Mistletoe bush is *in* the Oak tree, but it is found to be *upon* a branch of Maple, or Thorn, or Apple tree.

I cannot do better than insert here the following lively passage from the letter of one of our members. It shews at once, very graphically, his own zeal in the pursuit of science, and the caution essentially necessary in dealing with facts of rare occurrence. I regret that the excellent sketch sent with it must be omitted. "*You*, of course, will be particular in verifying every case of its occurrence on the oak, and the following instance of my experience will only be valuable to you in proportion to your capacity to enjoying the spectacle of *pain* in others. After our Annual Meeting, I was staying with a friend whom I knew to have a very excellent practical acquaintance with Natural History. I asked if he had met with Mistletoe on the Oak. He at once said he knew of one example which he had discovered himself two years before. It was growing on a scraggy bush of

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Oak that overhung the edge of a quarry in a coppice wood. I was glad to accept his offer to point it out to me and we made a special pilgrimage to see it. I was to climb and tear, and scuffle through the underwood and briars so as to come round on the top over the brink of the quarry, whilst my friend remained below to point out the position—with difficulty I got there, creeping down on all fours—and there sure enough it was, as pretty and healthy a bunch of Mistletoe as I ever saw. I thought I would have a specimen, not quite believing my own eyes (though both would have made affidavit of its genuineness on the spot); with much trouble and care, at length I got hold of the branch and was immediately struck by something unusual in the colour of the bark (the leaves were not out) so I at once tasted and found it *Apple*; one single small branch was growing out from under the stock of this Oak bush, the exact counterpart of all the other shoots. My disappointment you may conceive, but not the chagrin of my kind guide who had treasured up for two years the knowledge of this magnificent "find," and in his own parish too!"

A writer in the Quarterly Review (Vol. 114 p. 219) speaks of the Mistletoe as "deserting the Oak" in modern times. "It is now so rarely found on that tree, as to have led to the suggestion that we must look for the Mistletoe of the Druids, not in the Viscum album of our own trees and orchards, but in the Loranthus Europæus, an allied parasite, which is frequently found growing on Oaks in the south of Europe." A very unnecessary confusion it seems to me, has *been created* between the plants, and I purposely avoid entering further into the subject for the reason given in the Review. "There is no proof that the Loranthus ever grew further North than at present; whilst the Mistletoe figures not only in the traditions of the Celts, but also in those of Northern nations, as will be shown in the next section.

IV. The Romance of the Mistletoe.

"When the Romans first invaded Britain," says Dr. Henry (Hist. of Gt. Britain, Vol. I. p. 136), "the inhabitants of it were famous, even among foreign nations, for their superior knowledge of the principles, and their great zeal for the rites of their religion. This circumstance we learn from the best authority, the writings of that illustrious and observing general Julius Cæsar, who informs us: "that such of the Gauls as were desirous of being thoroughly instructed in the principles of their religion (which was the same with that of the Britons) usually took a journey into Britain for that purpose" (Cæsar de Bel. Gal. lib. vii. c. xiii.) and he then goes on to shew its antiquity—that its first and purest principles had descended with the language from Gomer, the eldest son of Japhet, from whom the Gauls, Britons, and all other Celtic nations derived their origin (Pezron Antiq: Celt. c. iii.), but that by tradition it had degenerated into "an absurd, wicked, and cruel superstition."

Mr. Davies in his learned work on the "Mythology and Rites of the British Druids," has endeavoured to trace out "the threads of connection" between the Druidical and Patriarchal religion, from the writings of the ancient Celtic Bards,

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Taliesin, Aneurin, Llywarch, Hên, Merddin, &c., who were themselves professed Druids. One of these old poems, the "Chair of Taliesin" (Kadeir Taliesin*) furnishes a long list of the apparatus requisite for the due celebration of the feast of the Ceridwen, and there we find the Mistletoe mentioned as one of the ingredients of the celebrated "*Mystical Cauldron*" which was always prepared with the most careful and elaborate ceremony. From this Cauldron, *Genius*, *Inspiration*, *Science*, and *Immortality*, were supposed to be derived. "It purified the votaries of Druidism for the celebration of certain mystical Rites which commemorated the preservation of mankind in the ark, and the great renovation of nature." I give the passage in the poem, with Mr. Davies' literal translation, and the explanatory note he has appended to it.

"Dawn ei lif Dofydd
Neu pren puraur† fydd
Ffrwythlawn ei gynnydd
Rei ias berwidydd
Oedd uch pair pumwydd."

(Kadeir Taliesin.)

"a flood which has the *gift of Dovydd*, or the *tree of pure gold* which becomes of a fructifying quality, when that Brewer gives it a boiling who presided over the cauldron of the *five plants*."

There is no mention made in the poem of any particular tree, from which the Mistletoe was to be gathered, nor of the ceremony requisite for so doing, but there can be little doubt from other authorities, that it must have been from the Oak. "Nor must the admiration of the Gauls for the Mistletoe be unnoticed," says Pliny. "The Druids (thus they call their chief-priests) hold nothing in greater veneration than the Mistletoe, and the tree on which it grows, provided only, that it be the Oak. They select groves of Oak trees, standing by themselves, and perform no sacred ceremonies without green oak foliage. Indeed, they truly believe, that whenever the Mistletoe grows upon the Oak, it has been sent from heaven, and they consider it a sign of a chosen tree.‡ But the Mistletoe is very rarely found upon the Oak. When it is discovered, they proceed to collect it with very great devotion and ceremony, and especially on the sixth day of the Moon. This period of the Moon's age, when it has sufficient size without having attained

* This poem Mr. Davies thinks from internal evidence, dates "long before the sixth century, in an age when the Britons were acquainted with the Romans, but whilst Rome itself as yet was Pagan. Not a single Christian idea is introduced: on the contrary, we find an open profession of *worshipping the Moon*, in *a general concourse of men*, and the lore of the Druids is declared to be meet for Sovereign princes." (p. 280.)

† NOTE.—"*Pren Puraur*, the tree of pure gold—the Mistletoe—Virgil's Aurum frondens, and ramus aureus—which the Arch-Druid gathered with a golden hook. Amongst the extraordinary reported virtues of this plant, was that mentioned by our Bard, of promoting the increase of the species, or preventing sterility. The names of the Mistletoe in the Welsh language preserve the memorial of its ancient dignity. It is called *Pren Awyr*, the Etherial tree; *Pren Uchelwar*, tr e of the high summit; and has four other names derived from *Uchel*, or lofty." (page 280.)

‡ Mr. Davies in his Celtic researches says that "the Apple was the next most sacred tree to the Oak, and that orchards were planted in the vicinity of the sacred groves." (Mr. Lees in Phytologist, 1851, p. 357.) But in his "Botanical Looker Out" it is said that Mistletoe from the Hazel was preferred by the Druids, next to that from the Oak, but on what authority I know not.

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the half of its fulness—makes the beginning of their months, and years, and of an age, which consists but of thirty years." (C. Plinii Nat. His. lib. xvi. c. 44.)

The grand ceremony of cutting the Mistletoe from the Oak, was the New-year's day festival of the ancient Britons, and it was held on the sixth day of the moon, as near to the 10th of March, as the age of the Moon permitted. The New-year's day festival of our forefathers would have fallen, this present year, on the 14th of March, and if we, and the Eastnor Oak with its fine luxuriant bunches of Mistletoe, could throw ourselves back into history some 2000 or 3000 years, this grand festival would have been held last Monday, and we should now, doubtless, have been discussing the events of the day. The exact proceedings of the Druids on this great Annual Festival are thus described by Pliny. "Calling the Mistletoe in their manner of speaking—a cure-all (or all-heal), and having got the sacrifices, and the good things for the feast, all properly ready under the tree, they lead up two white bulls, and begin by tying them by their horns to the tree. The Arch-Druid, clothed in a white robe, then mounts the tree, and cuts the Mistletoe with a golden sickle. It is caught as it falls in a white cloth. Then they offer up the victims as a sacrifice, praying that God would make His gift prosperous to those to whom it had been presented. They believed it would give fruitfulness to all barren animals, and would act as a remedy against all poisons." (*ibid.*)

The animals were killed, cut up, and cooked, meantime prayers were offered up; hymns were sung; and the heaven-born plant, thus carefully saved from pollution by any touch of the earth, was distributed in small sprigs amongst the people, as a sacred relic for the new year; a charm to ensure fecundity; a panacea against every disease; a remedy for poisons; and a safe protection against witchcraft, and the possession of the devil. Many a good wife has travelled for days, perchance, on a pillion behind her husband, through bogs and fords, and over wide tracts of uncultivated land and primeval forest, to attend this festival; leading a sumpter horse, laden with their offerings to the priesthood, and all the good things they could muster for the festival; venison and salmon; roasted bustards and boars' hams, with cakes and other delicacies; not forgetting some well filled skins of Metheglin, or mead: happy, in being able, as a recompense for so much toil, to procure from the hand of the Arch-Druid, for herself and her husband, so many blessings in the coming year.*

The memory of the Druidical ceremonies is still kept up in Normandy, as they give the Mistletoe to each other on new year's-day, by the saying "Au guy l'an neuf," and in Picardy they add the word "plantez" to wish a plentiful and prosperous new year to each other. (Chambers' Encyclopædia.)

* "You recognise amongst the Druids the conditions of all primeval people, as they are found in the East amongst the Egyptians, the Israelites, &c. They had combined completely in themselves the whole conduct and rule of the people as the Priest-physicians, and many of their customs accorded fully with those of the East. The Druids communicated their fundamental doctrines and customs only to the initiated whom they taught in sacred groves and remote places. (Cæsar lib. iii., c 14.) In the exercise of the sacred services, the Druids, like the Egyptians and the Pythagoreans, were clad in a white robe. They healed sicknesses and diseases by magical practices, while they professed to have intercourse with the Gods; they proclaimed future events; they were also acquainted with the means of producing ecstasy, and as one of the most excellent magical means—and as one adapted to nearly all possible cases—they used the Mistletoe of the Oak, which they gathered at certain times and with certain ceremonies.' (Ennemoser's History of Magic, Vol. ii., p. 87, translated by Mary Howitt.

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The Mistletoe has entered into the Mythology of other nations besides the Britons and Gauls. The fact of its great peculiarity in ripening its fruit and thus coming to its perfection in the winter solstice, has been very happily rendered in Icelandic poetry, where Baldur, the Sun, is supposed to be slain by a sprig of Mistletoe, as the only plant capable of injuring him. In the poem of Voluspa, or visions of Vala, in the Œdda of Sæmund, Vala tells of the death of Baldur in the following stanza, translated from the French of M. Bergmann :—

"I foresaw for Baldur, for that bloody victim,
For that son of Odin, the destiny reserved for him :
He was raising in a charming valley
A tender and beautiful Mistletoe.
From that stalk, which appeared so tender, grew
The fatal arrow of bitterness, that Hoder took upon himself to dart."

(Madame Ida Pfeiffer's "Visit to Iceland," p. 329.)

But the idea is so much more fully and beautifully expressed in the legend on the death of Baldur, given in the tale of "The Young Norseman," by Mr. W. B. Rands, which appeared in the "Boy's Own Volume," that I attach it entire, as an appendix to this paper.*

"More than one sword of a Northern Champion was named 'Mistilteinn,' after the weapon which had slain the white god. The story affords one of many points of resemblance between the mythology of Northern Europe, and those of Persia and the far East. In the Shah Namêh, the hero of Asfendiar is represented as invulnerable, except by a branch from a tree growing on the remotest shore of the ocean. Desthân his enemy found it, hardened it with fire, and killed the hero. Both legends possibly refer to the 'death' of the Sun; perishing in his youthful vigour, either at the end of a day struck by the powers of darkness, or at the end of the sunny season stung by the thorns of winter." (Max Muller's "Comparative Mythology" in Oxford Essays for 1856.) "The 'Marentakken,' or 'branch of spectres' which still in Holstein is believed to confer the power of ghost-seeing on its possessor, is unquestionably the true Viscum album."—(Quarterly Review, Vol. 114, p. 220.)

It is very difficult to trace down in history the customs relative to the Mistletoe, after the overthrow of the Druidical ceremonies in which it played so important a part. We know that in more serious matters—superstitions of deeper import, and more injurious tendency,—our stubborn ancestors resisted for many centuries all attempts to set them aside: "so deeply rooted" says Dr. Henry, "were these pernicious principles and superstitious practices in the minds of the people, both of Gaul and Britain, that they not only baffled all the powers of the Romans, but even resisted the superior power and divine light of the Gospel for a long time after they had embraced the Christian Religion. This is the reason we

* The Mistletoe, Trefoil, Oak, and Wheat form the Bardic emblems of the four seasons, and, as such, the Mistletoe was figured on the jewelled National Token, given by the Ladies of South Wales to the Princess of Wales. (Illustrated London News March 5th 1863.)

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meet with so many edicts of Emperors, and Canons of Councils in the sixth, seventh, and eighth centuries against them, and even so late as in the eleventh century, in the reign of Canute it was found necessary to make the following law against these heathenish superstitions. "We strictly discharge and forbid all our subjects to worship the Gods of the Gentiles; that is to say, the Sun, the Moon, fires, rivers, fountains, hills, or trees, or woods of any kind." (Leges Politicæ Canuti Regis, c. 5. apud Lendenbrog in glossar, p. 1473.)

It is not likely that the Mistletoe could possibly escape the effect of so much authoritative denunciation. As the object of the New-year's day festival, it had become a sign of the religion itself; and the very mention of its name and certainly of the virtues attributed to it with so much pomp and ceremony, would be strongly condemned. The Mistletoe, however, was not thus to be lightly set aside. Laws might denounce it, as an emblem of Paganism, but no power could prevent its private use. It had become a household, or rather, perhaps, a personal mark of the religious faith of the people. The belief in the chief virtue given to it so solemnly, was a part of their religion itself, and the more it was denounced, the more strongly would it maintain a place in their faith.

When at length the Old Style of computing time had passed away, with the Druidical Priesthood, and their ceremonies, and the New Style had become established, the sixth day of the moon's age must obviously have lost more and more of its significance. As the people became accustomed to the change in their New-year's day, we can readily imagine that the Mistletoe would become associated with the change, as still the sacred charm for prosperity in the coming year, and the cherished symbol of their old superstitious festivities.

Medical writers of all times seem to have regarded the belief in the fertilising powers of the Mistletoe, as a mere fanatical superstition and unworthy of scientific notice. Hippocrates, Dioscorides, Galen, Matthiolus, Paracelsus, Kolderer, Cartheuser, Colbatch, Loseke, Van Swieten, &c., &c., whilst they extol its virtues, as a remedy for Epilepsy in chief, and also for Paralysis, Chorea, Hysteria, and other Nervous, and Convulsive diseases;—and the glutinous matter of the berries for external uses—say nothing whatever of any more special virtue. Even in Epilepsy, says Pliny, "Quidam id religione efficacius fieri putant, primâ Lunâ collectum e robore sine ferro. Si terram non attigit, comitialibus mederi." (p. 442.)*

The real properties of the plant itself are those of a slight tonic. (Barton and Castle British Flora Medica. Vol. ii. p. 146.) The leaves and shoots have an

* What is the Mistletoe good for? I asked of a man learned in country customs, and great in faith. "That do depend on what tree it comes from," he answered. "It be a very fine thing for fits. My father had the Leptic fits for many years afore he died. He tried almost all the Doctors in Hereford, and the Infirmary too, but nothing did him so much good as Mistletoe from the Haw, mixed with Woodlaurel, and he took nothing else. Sometimes he took it in powder, with honey, and sometimes made a tea of it. Then my daughter took Mistletoe for the Sterricks but it didn't cure her; so may be, it was not the right sort. They do tell me that Mistletoe from the Maiden Ash be a fine thing for Convulsives, but I never had much to do with giving it to people. I know when you get it from the Mawpell it's good for animals. It's capital for sheep when they don't go on well at lambing time, and for cows too. That as comes from the Apple tree and Poplins is the best to hang up in the house on New year's day for good luck through the year, but a many people use any that comes first."

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astringent and rather bitter taste, and "strong extracts made from them are nauseous, bitterish, and sub-austere." (Lewis's Mat. Medica, p. 575.) The berries are reputed to act as a purgative, and are even now sometimes given to sheep for this purpose.

In Prussia in times of great scarcity the branches and leaves of the Mistletoe have been used, says Bock (Nat. His. of Prussia, Vol. iii. p. 367) powdered and mixed with rye flour, to make bread, which is by no means unwholesome. In this County before turnips were so abundantly grown, the plant used regularly to be given to sheep in frosty or snowy weather.

> "If snowe do continue, sheepe hardly that fare
> Crave mistle and ivie for them for to spare."
>
> (Tusser's Husbandry.)

There can be no question, however, that the chief virtue ascribed to Mistletoe from the Oak by the Druids was the "fructifying quality," as Taliesin has it, or of giving "fertility to all animals" as described by Pliny; and it was for this virtue, when worn as an amulet, or when drunk in infusion, that the sprig of Mistletoe was so anxiously sought from the hands of the Arch-Druid on the New year's day festival. It is always necessary to remember this in endeavouring to trace down the domestic history of the Mistletoe in succeeding ages. It explains fully the personal hold it had gained in the esteem of the people—and its continued private use in spite of all opposition. Though books ceased to mention it, tradition would perpetuate its use, and it will be shewn presently to have done so, even to our day.

This peculiar virtue may perhaps serve to explain some points with regard to it, which have not been otherwise satisfactorily accounted for. "In one of Colepeper's MSS. at the British Museum in a curious notice of Sir Peter Freschville's house at Stavely, Derbyshire, is this passage: "Heare my Lord Freschville did live, and heare grows the famous Mistletoe tree, the only oake in England that bears Mistletoe, * and to this tree the following letter from The Countess of Danby to Mrs. Colepeper probably refers. It is without date, but was written between the years 1663 and 1682.

> "Dear Cozen,
>
> Pray if you have any of the Miselto of yor fathers oke, oblidge me so far as to send sum of it to
>
> yor most affectionat servant
>
> Bridget Danby."

(N. & Q. Vol. vii. p. 119., 1st s.)

Let us hope that the Countess's desires were fulfilled in all respects!

* The remains of the Oak still exist, and the Mistletoe was there in 1803, but it has long since disappeared.

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It has occurred to me whether the "fructifying virtue," given to the Mistletoe by the Druids might not explain, in part, why the Mistletoe should never have been generally used in decorating our Churches. As a symbol of the Paganism of the Druids, its significance has passed away centuries since; and if this were the objection to its use, the Holly also should be rejected. "The Holly," says Shirley Hibberd (Notes & Queries 1st ser. Vol. v. p. 208), "owes also its importance in the Christmas festivities to Paganism. The Romans dedicated the Holly to Saturn, whose festival was held in December; and the early Christians, to screen themselves from persecution, decked their houses with its branches during their own celebration of the Nativity." It may be, however, that the fact of the Mistletoe being the especial emblem of the New-year's-day festivities, has prevented its use for Christmas decoration: or it may be also, I must add, that this favourite parasite has taken too prominent a place in the rejoicings of the kitchen, to secure for itself a place in the church.

For a time, indeed, it seems to have been used in decking the church, the poet Gay (Trivia, Book ii. p. 437), thus refers to it:—

> "When rosemary and bays, the poets crown,
> Are bawl'd in frequent cries through all the town;
> Then judge the festival of Christmas near,—
> Christmas, the joyous period of the year;
> Now with bright holly all the temples strow,
> With laurel green and sacred Mistletoe."

"It seems something like caprice," says a writer in the Quarterly Review, "which has excluded the Mistletoe as well from the decorations of our Churches at present, as from their ancient sculpture and carvings. We know of one instance only of its occurrence—Sprays of Mistletoe, with leaf and berry, fill the spandrels of one of the very remarkable tombs in Bristol Cathedral, which were probably designed by some artist monk in the household of the Berkeleys, whose ample and broad lands are among the chief glories of the west Country, in which the Mistletoe is now for the most part found." We do not remember to have seen it elsewhere, even lurking among quaint devices of 'Miserere'; whilst the Oak—every portion of which, in the days of Celtic heathenism, was almost as sacred as the Mistletoe which grew on it—was one of the principal trees 'studied' by mediæval sculptors, when, during the so-called 'Decorated' period, they reproduced leaf and flower with such exquisite beauty and fidelity—witness the oak leaves laid into the panels of the Cantilupe shrine at Hereford, or the twisted sprays of oak, clustered with acorns, which form one of the most graceful corbels in the choir of Exeter Cathedral." (Quarterly Review, Vol. 114, p. 220.)

"Certain it is," says a writer in Notes and Queries (Vol. vi. p. 523, N.S.), "that Mistletoe formerly had place amongst Christmas decorations of Churches, but was afterwards excluded. In the earlier ages of the Church many festivities not tending to edification had crept in—mutual kissing amongst the number—but as this soon led to indecorum, kissing and Mistletoe were both properly bundled out of the Church." (Hone. Hook. Moroni. Bescherelle. Du Cange. &c., &c.)

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Mr. Edwin Lees, says quaintly in one of his books, * "the Druids thought the Mistletoe would cure everything, we only think it worth . . a kiss." When it received this specific valuation seems a mystery. "Why Roger claims the privilege to kiss Margery under the Mistletoe at Christmas," says the learned Editor of Notes and Queries, "appears to have baffled our Antiquaries." Brand states that this Druidic plant never entered our sacred edifices but by mistake, and consequently assigns it a place in the kitchen, where, he says, it was hung up in great state with its white berries, and whatever female chanced to stand under it, the young man present either had a right, or claimed one, of saluting her, and of plucking off a berry at each kiss. Nares, however, makes it rather ominous for the fair sex not to be saluted under the famed Viscum album. He says the custom longest preserved, was the hanging up of the bunch of Mistletoe in the kitchen, or servants' hall, with the charm attached to it, that the maid who was not kissed under it at Christmas, would not be married in that year." (1st s., Vol. v. p. 13.) Mr. Shirley Hibberd thinks this account altogether unsatisfactory. "Would it be not more reasonable," he says, "to refer it to the Scandinavian mythology, wherein the Mistletoe is dedicated to Friga, the Venus of the Scandinavians." (Ibid p. 208.) It seems rather doubtful whether this custom would be likely to originate in any deduction from "reason" at all; and I am quite sure the privilege could not rightly be claimed on Christmas Day. The only other suggestion that offers itself is, that tradition should have handed down this pleasant ceremony from the New-year's day festivities of Druidical times. If it be not so, where history is silent, and antiquaries at fault, we are only left to suppose the present existence of some mutual attraction—given, the feasting and festivities below stairs—and the conduct of Roger and Margery seems natural enough.†

Herefordshire may be considered the centre of the Mistletoe district of England; with Shropshire to the North, and Worcestershire, Gloucestershire, and Monmouthshire, to the East, South, and West: and when, moreover, it is considered, how comparatively isolated its situation was before the introduction of Railways, here we might expect to find remaining, if anywhere, the existence of a belief in its special Druidical repute, and here—though authors for centuries have ceased to mention it—it still does exist. It is somewhat altered in character, as might be expected. I have asked the question of many old agriculturists and people learned in country customs, 'Is the Mistletoe ever used for any purpose now'? and it is a fact that the one answer I have had from every single person has been "Yes, it is an excellent thing to give sheep after lambing," and some add,

* "*Pictures of Nature*," around Malvern Hills and the Vale of Severn—a book that every lover of nature, who has seen or known the hills, must rejoice in possessing. It deserves to be much more freely illustrated when it could not fail to be still more generally attractive.

† Hone, in his "*Every Day Book*," relates a discussion which took place at a Christmas party, as to which might be the great and crowning glory of Christmas festivity. One said "mince pie"; another said "beef and plum pudding"; some said "wassail-bowl"; but a fair maiden blushingly suggested "the Mistletoe." (Notes and Queries, Vol. vi.)

"But when Mistletoe is not to be obtained" says Halliwell "*the kissing-bunch*," a garland of evergreens, ornamented with ribbons and oranges, may be substituted for it at Christmas." (Ibid.).

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"and for cows too after calving." * I have several times been told that it must not on any account be given to them before, and know that accidents in the families of our domestic Animals are sometimes attributed to its having been eaten prematurely. I may say indeed, with truth, that it is a common practice in this county now to give it to sheep at this particular time. It is true that the Mistletoe is a gentle tonic, that the animals like it, and will often eat something fresh and green when they will not take anything else, but it is very remarkable that it should only be given to them on this occasion, and never for weakness produced from any other cause. Tradition has somewhat altered its original Druidical repute if it be so, but the common practice still bears so close a relation to the "increase of the species," that I cannot but regard the general belief in its efficacy in this special way, as a very singular and interesting example of Druidical influence carried down, century after century, for nearly 2000 years. The fact of its taking, in our day, a somewhat modified form, only strengthens the probability that this supposition is correct.

The Mistletoe still holds well its place in the esteem of the people, if not in their veneration. There is scarcely a house or cottage in this county that has not its bunch of Mistletoe for New-year's day. The ancient custom is still observed aright in most of the farm houses through the County, by all the old true Herefordshire inhabitants; and especially by the lower classes. The Mistletoe bough is cut on New-year's Eve, and hung up in state as the clock strikes twelve; the old one, which has hung throughout the year, is at the same time taken down and burnt.†

The Mistletoe does not appear to have been considered a Christmas evergreen until the close of the sixteenth or the beginning of the seventeenth century. "We have Christmas Carols in praise of Holly and Ivy," says Timbs ("*Things not*

* For giving to Cows, the popular belief is that it should be gathered from the Hawthorn or Maple. It was from a woodman near Ledbury that I first heard of the continued existence of this use for Mistletoe. "Mistletoe aint of much use now Sir, as I knows on," said he, "except for one thing and then it do beat everything. A piece of Mistletoe from the Haw,—from the Haw Sir," he repeated, "chopped in pieces and given to a Cow after calving, will do her more good nor any drench you can give her," and this has been confirmed from other parts of the County. Sir Thomas Browne ("*Vulgar Errors*," Book ii. c. 6) also states that it is a common country practice to give Mistletoe to Cows at this particular time.

"A Worcestershire Farmer," says Cuthbert Bede, "was accustomed to take down his bough of Mistletoe, and give it to the Cow that calved first after New-year's day, which was supposed to ensure luck throughout the year to the whole dairy. (N. & Q. Vol. iii. p. 313.)

† "The Mistletoe bough," says Mr. Haywood, of Worcester, "should always be gathered by the last male domestic that has entered the family. It is then dressed with nuts, apples, ribbons, &c., and suspended in the centre of the room, sometimes with a cord attached to a pulley, to allow of its being lowered for the lady to pick a berry. The berry should then be thrown over the left shoulder. I once saw, at an old mansion near Worcester, a large bunch of Mistletoe beautifully bedecked, and so cleverly suspended, that by means of strings it could be pulled to any part of the ceiling, and thus be brought over the heads of any ladies who could not be induced to go under it." The proper time for hanging up the Mistletoe however, Mr. Haywood states, very decidedly, to be *Christmas Day*, by Worcestershire custom—thus giving very clear proof of a border district for Mistletoe, where the true traditions with regard to it have been lost at a much earlier period than in the centre. "This is the common custom of North Worcestershire to this day." Mr. Haywood goes on to say, "and it is also usual to keep part of the Mistletoe bough used at Christmas in the house until the following Christmas, when the new one is brought in and the old one burnt. It is said to be most wonderfully efficacious in expelling witches and keeping hobgoblins away. I know a poor woman, upwards of 70 years of age, who walked two miles for a bit to put in some "*broathens*" for her pig that had been bewitched by a bad neighbour. I saw her with it, and laughed at her credulity: but she was not to be shaken in her faith. I afterwards found that the pig recovered and made a good one.'

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generally known," 1st series p. 159), of even earlier date than the fifteenth century; but allusion to Mistletoe as a Christmas evergreen can scarcely be found for two centuries later, or before the time of Herrick:—

> "Down with the rosemary, and so,
> Down with the baies and mistletoe;
> Down with the holly, ivie, all,
> Wherewith ye dressed the Christmas Hall."

Coles in his "*Knowledge of Plants,*" (1656), says of Mistletoe: "It is carried many miles to set up in houses about Christmas time, when it is adorned with a white glistening berry," and in the tract "*Round about our Coal fire, or Christmas Entertainments,*" published early in the last century, it is said "the rooms were embowered with holly, ivy, cypress, bays, laurel, and mistletoe; and a bouncing Christmas log in the chimney."

"Kissing a fair one under the Mistletoe," says Timbs, "and wishing her a happy new year, as you present her with one of the berries for luck, is the Christmas custom of our times; and in some places persons try lots for the bough with most berries, by the crackling of leaves and berries in the fire":—this conclusion is certainly inconsistent, and tends itself to prove the new-year character of the Mistletoe.

Gay's description has already been given, and many more might be added to shew it a Christmas evergreen in later times, but it is unnecessary, since they are chiefly written by authors who were not acquainted with Mistletoe lore. They lived beyond the range of true Mistletoe customs; where the plant did not grow naturally, or only very sparingly; and where, consequently, there were no traditions existing amongst the common people with reference to it.

The old new-year's-day custom, indeed, is rapidly changing,—even here, in the very centre of the Mistletoe district—and where, as I have shown, its traditions endure so tenaciously. Partly from lapse of time, perhaps, but chiefly from change of inhabitants, the Mistletoe is changing its character as a symbol of new-year's-day, to take its place with the holly, as an emblem of the festivities of Christmas.

No man, perhaps, has done more to effect this change, than he, who of all modern writers would the most regret it—Sir Walter Scott.—Great lover as he was of folk-lore, and the traditions of the people, he was quite ignorant of the history, and legendary lore of the Mistletoe. His spirited description of Christmas-tide, in the introduction to the sixth Canto of Marmion, ever hangs on the memory:—

> England was merry England, when
> Old Christmas brought his sports again.
> 'Twas Christmas broached the mightiest ale;
> 'Twas Christmas told the merriest tale;
> A Christmas gambol oft would cheer
> The poor man's heart through half the year.

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On Christmas eve the bells were rung;
On Christmas eve the mass was sung.

. . . . . .

The damsel donn'd her kirtle sheen;
The hall was dressed with holly green,
Forth to the wood did merry men go
To gather in the Mistletoe."

Had a single sprig of Mistletoe grown in the domain of Abbotsford, we may safely say that the two last lines would never have been written. Who can wonder that lesser writers should follow, year by year, with increasing devotedness, in the same track. One of these productions it behoves me to notice for the very name it bears, and the popularity it has gained, albeit, the song of "*The Mistletoe Bough*," does injustice to the plant itself; is a modern-antique of a mild order; and worse than all, owes its renown and its interest, to an unacknowledged plagiarism;

"The Mistletoe hung in the Castle hall,
The holly branch shone on the old oak wall,
The Baron's retainers were blythe and gay
Keeping their Christmas holiday."

The burden of the song—which has made most of us tremble with horror—is the tale of Genevra, the bride, shut up in the old oak chest, from Rogers' "Italy."

In the Midland and Northern Counties the Mistletoe is very rare, and it could not be expected that its traditions should be known. Nevertheless the interest in this plant is so universal, that this deficiency—like many of another kind—has been met by the improved means of transit in modern times. The Mistletoe has now actually become an established export from this County, and there perhaps never was a year when so many people rejoiced in its presence at their Christmas festivities as during that which has just passed. Through the politeness of the Traffic Managers for the Great Western, and London and North Western Railways at Hereford (Messrs. Wall and Cartwright), I am enabled to give you an approximation towards the correct return of the quantity of Mistletoe actually sent out of this County last December. The exact returns are as follows:—

	Tons.	Cwt.	Qrs.
Hereford sent off	25	0	0
Withington	7	15	0
Ledbury	15	2	3
Moreton	2	11	1
Dinmore	3	3	0
Leominster	12	14	0
Berrington	0	16	0
Woofferton	2	0	0
Ludlow	0	1	3
Ross	15	0	0
Moorhampton	5	0	0

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making a total of eighty-nine tons, three hundred weight, and three quarters, actually sent off by invoice. But the guards and engine-drivers had the privilege of exporting Mistletoe on their own account, and did so by almost every train that left the County during the early part of December. An immense quantity went off in this way, and I am told that I greatly under-estimate it, when I put it down at 25 tons in addition—thus making a grand total of more than one hundred and fourteen tons.

The places to which it was chiefly sent were Manchester and Liverpool,—for their supply, and that of Towns further north—London—and Birmingham.

The established price paid for it, when delivered at the stations, was from four to five shillings per cwt. according to its condition; and the average rate of charge for the transit was about thirty shillings per ton; so that the whole expense of delivery may be said to be from five to six pounds ten shillings per ton.*

I have purposely given you all these details; they are distinctive of the age in which we live. It is a practical, commercial, unpoetical period, when trains will wait for neither the peer nor the peasant; and when common-place railway trucks carry off romance—in the shape of Mistletoe—at so much per ton! Had good Sir Walter Scott lived in these days, it would never have occurred to him to send his "merry men" to the "woods" for it—where, by the way, they would never have found it—but the Mistletoe none the less, would have reached him; and if he had chanced to look over his greengrocer's bill, he would, doubtless, have found some such items as these:

To a bunch of Mistletoe, fine and full of berries	£1	0	0
To pieces of ditto ditto, for decoration	0	7	6

There only remains for me the pleasant duty of thanking those gentlemen who have so kindly answered my enquiries and given me so much information. To the Rev. F. T. Havergal, I am indebted for the opportunity of consulting the books in our valuable Cathedral Library: Thomas Blashill, jun., Esq., has been most useful to me in looking up authorities in the British Museum and in other ways: The Rev. Thomas Woodhouse has been a greater help to me than he would be willing to allow, for an example, see Appendix B. The Rev. Thomas Hutchinson, the Rev. W. H. Purchas, Dr. Willis, of Monmouth; Elmes Y. Steele, Esq., Abergavenny; and our Honorary Secretary, R. M. Lingwood, Esq., have kindly assisted me in various ways. Mr. Adams, of Marden, has taken much trouble in his enquiries for me, as has been acknowledged previously. Flavell Edmunds, Esq., has given me much information on divers subjects: and

* "Many people would be greatly amazed," says Mr. Haywood, "were they to stand on Worcester bridge for a short time, any Market day a few weeks before Christmas, from about six to nine o'clock in the morning. They would see vehicles of every description, from the largest waggon down to the donkey cart and wheel-barrow, loaded as high as can be piled with the "hallowed mirth-inspiring Mistletoe." All this is eagerly bought up by men called 'Badgers,' who pack it in casks or crates, and send it off to decorate the houses of our neighbours in Manchester, Liverpool, &c.. I have made enquiry of the Badgers, and they say the price of Mistletoe is about £4 per ton, and that upwards of 100 tons are annually sent from Worcester."

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last, though not least, I am indebted to Mr. Cranston, of Kings-acre, for his opinion on many points; especially for giving me the thread that guided me through the difficult labyrinth of introduced Poplars.

In conclusion I must state to them and others, that no one can be more sensible than I am myself of the many deficiences of this paper, and that it would be very satisfactory to me to add a supplement to some future number of the Transactions if sufficient additional information could be obtained with regard to the Mistletoe, and the trees upon which it grows.

POSTSCRIPT.—Whilst this Paper has been in the Press, the following additional examples of the occurrence of the Mistletoe in this County have been reported to me, viz.—on the Sycamore in the grounds of Barton Court, near Ledbury, (Captain Peyton), the second instance only of its growth here; on the willow, (*Salix alba*) on the banks of the Wye, below the Weir, (the Rev. E. Du Buisson); on the Mountain-Ash at Tarrington School, (Mr. Fraser); on the Acacia at Downshill, (Mr. Musgrave); on Maples and Thorn in St. Devereux Park; and, as a matter of course, I have heard of another Oak said to bear it, too late to disprove the assertion. I have also been assured that the Mistletoe grows on an Oak in the Bishop's Park at Farnham, Surrey (Mr. Findlay), but have not had time to make enquiries about it.

ERRATA: Page 316, the Mistletoe is stated to be "very common" on the Black Poplar (*Populus nigra*); it should be "not common"; and very remarkable it is, that it should be so rare in this tree, since it so closely resembles in its habit of growth the Black Italian Poplar (P. monolifera), in which the parasite grows so very freely.

Page 318, the Mistletoe is stated to grow on the Pink Horse-chesnut at Harewood,—it is the yellow variety on which it is found there, making the second example of its occurrence on the Æsculus flava in this county.

Page 323, the botanical name of the common Laurel is "*Prunus lauro-cerasus*," and not cerassus colchicum, as accidentally given in the text.

APPENDIX A.

THE DEATH OF BALDER.

From the Tale of "The Young Norseman" *by Mr. W. B. Rands, in the* "*Boys Own Volume*" *for* 1863. (p. 143-4-5.) Beeton: Strand.

"Once upon a time, Balder the Beautiful, whom all gods loved, and all men, and all things that breathed, and that had not breath, was troubled in his sleep with bad dreams, which made it seem to him that he must die. Then Freyga, who was exceeding fond of Balder, and was, indeed, said to be his

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mother, stood up in the peace-stead, and declared that she would take this matter in hand, and that Balder should not die, if Odin would give her leave to sit but once in Lidskialf, so that she might look out over all the heavens and the earth. For Lidskialf was the chair of Odin, in which none but he himself might sit—such was the decree of the gods—and he often sat there, that he might see all that was being done in Jotunheim by the Giants, and what charms were being prepared by the swart little Lapps, and other sorcerers. However, the gods considered it thoroughly among themselves, and at last it was decreed that Freyga might sit in Lidskialf for once, only she was not to tell of it, and it was never to be permitted again.

So Freyga was very much pleased, and went up all alone to Odin's high seat, and looked out upon heaven and earth, and cried with a loud voice—

"Who loves Balder?"

Then arose a sound like the voice of ten thousand thousand seas—a voice from all things, above and below, that they all loved Balder. Fire, and water, and iron, and wood, and stones, and beasts, and birds, and poisons, and serpents, and all things whatsoever, spake for Balder.

Then Freyga looked out once more all over the heavens and the earth, and said, also with a loud voice—

"Who loves not Balder?"

And there was no answer. But a strange noise came up from the eastward of Valhalla, which Freyga could not clearly make out.

"I think," said she at last, "it is only Lok the mischief-maker laughing. It is of no consequence—he laughs at everything."

And as she spoke, she saw Lok laughing and mocking to himself, with his hair blown about in the wind, and his arms spread over his head, and she despised him in her heart. And she looked angrily and scornfully on him; and while she looked he seemed to change into a little shrub which the wind was at play with.

"It is only the mistletoe," thought Freyga; "it is very little, and no consequence."

Then Freyga looked out yet a third time over heaven and earth, and spake with a voice yet stronger than before—

"O fire and lightning, hurt not Balder!"

And a loud consenting voice made answer. So that Freyga was content. Then she said—

"O water, and wind, and hail, and snow, hurt not Balder!"

And there came a voice as before, and Freyga was content. And she spake yet again—

"O iron, and stone, and earth, and wood, hurt not Balder!"

And there came a voice as before, and Freyga was content. And she spake yet again—

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"O poisons, and plagues, and creeping things, hurt not Balder!"

And there came a voice as before, and Freyga was content. But she spake yet again—

"O beasts, and birds, and trees of the forest, hurt not Balder!"

And there came a voice as before, and Freyga was content. So that she spake no further from Lidskialf.

"I think," said she to herself, "that will do very well indeed."

But just as she was gathering her garments around her to step down from Lidskialf, which was nine hundred and ninety-nine golden steps to it, she heard once more what seemed to be the sound of distant laughter.

"It is only Lok again," said Freyga; "he is always laughing." And looking forth upon the east of Asgard, where she had seen the little mistletoe, she saw Lok, whose sides were shaking with mirth. "I thought it was a mistletoe-bush," said she, "but it seems to be Lok."

So she came back to the Asir, and told them Balder's dream would come to nothing, for she had made all things in heaven and earth make oath not to hurt him.

After this the gods used to make much sport with Balder of an afternoon, for he was very good-natured. It was their manner to make a target of him, some throwing darts, some slinging stones, and some hewing at him with their swords and battle-axes; but there was nothing that hurt him. Nanna, his wife, was very pleased with this, and it was great amusement for the other gods, all except Lok, who was not only on tip-toe, as he always was, for mischief, but was very jealous that less regard was paid now than formerly to his antics, because the Asir found so much entertainment in throwing things at Balder. Now Lok had his suspicions about the mistletoe, and, putting on the shape and attire of a woman, he went to Freyga's house, which was on the sea shore, and said—

"I have noticed of late that the Asir are in the habit of standing in a circle around Balder and trying to hurt him, and yet none of the things they use seem to do him any harm. How is that?"

Now Freyga was proud of what she had done when she had ascended Lidskialf, and she said to Lok, taking him for the woman he seemed to be—

"You must be very ignorant not to know that nothing can harm Balder, for all things in heaven and earth have sworn never to do him ill."

"What!" said Lok, "all things?"

"Why, yes," said Freyga, "you may well say all things, for who would call the mistletoe a thing? I did not think it worth while to ask so insignificant an affair for an oath."

This was just what Lok wanted to hear, and what he expected to hear. So the next time the gods were having sport with Balder, he took with him a sprig of the mistletoe, and went up with it to Hoder, who, being blind, was standing sadly apart from the rest.

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"Why do not you also fling somewhat at Balder?" said Lok.

"First," answered Hoder, because I cannot see where he stands, and secondly because I have nothing to throw."

"Well," says Lok, "hold out your hand slyly—behind you—and I will put into it something to throw at Balder, and will, moreover, direct your hand, so that you shall take good aim."

Now, when the Asir saw Hoder making ready to throw this small branch at Balder, they all laughed heartily, and Balder among the rest.

"Put up your weapon, Hoder, for it seems to me too dangerous a thing to throw."

Those were the words of Balder. But Lok, at the same moment, directed the aim of Hoder, and the mistletoe-bough went straight to the temples of the White Sun-god, who fell down dead"

APPENDIX B.

HISTORIC DOUBTS.

Exception has been taken so ably to the quotations from Dr. Henry and Mr. Davies which open the last section of this paper, that the subject must not be left altogether unnoticed. It is asked, what proof have we that the Britons were descended from Gomer? There is an interval of some 2,000 years between the age in which Gomer lived and the earliest period at which we find mention of the Britons. It is a mere unsupported hypothesis. We do not even know that Gomer was, as he is here asserted to be, the eldest son of Japheth.

Still greater objections are urged against the supposed "connection between the Druidical and Patriarchal religions." The little we do know of what the Patriarchal religion really was shows a most material difference between them. The Patriarchal religion was certainly a worship of the one true God: the Druidical religion was, as certainly, an idolatrous system, consisting as all accounts agree, in the worship of the heavenly bodies, and of the gods whom the Romans call Hesus and Teutates.

Some objectors have even gone further than this, and doubted the existence of Druids at all. This seems a most unreasonable piece of scepticism, in the face of the evidence of such contemporary writers as Strabo, Tacitus, Suetonius, Pliny, and, above all, Cæsar, the earliest, and by far the best of all our authorities on the subject.

With very much higher interest and originality, the Rev. Mr. Woodhouse points out the very striking resemblance that exists on some points between Druidism and Brahminism. We know that the maintenance and honour of a sacerdotal *caste* was the leading feature of the religion of the ancient Britons;

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just as it is, at this day, of that of the Indians; the *caste* of the Druids strongly resembling in position and privileges the *caste* of the Brahmins. In fact, the very existence of a sacerdotal *caste* invested with such powers, and regarded with such reverence as the Druids were, betrays the oriental origin of the system. Nothing like it existed in any other western nation; not even among the Germans, the close neighbours of the Gauls and Britons, was there anything of the kind. Such a connection is by no means improbable, when we recollect that there is also an undoubted connection between the languages of Britain and India, the Celtic and the Sanscrit: when, moreover, it is remembered that ethnologists are agreed in the belief that extensive migrations took place in prehistoric times from Central Asia, the great seat of the Aryan races, into western Europe.

Such remarks are as interesting as they are suggestive, but seeing that the subject of this paper is "Mistletoe" and not "Druidism," with all due deference, the text has been allowed to remain. If it has been shown, successfully, that Mistletoe has been held in honour from the times of the Britons to our own: that it has always been connected with the celebration of the New Year, and supposed to have certain mysterious virtues; that even among races of other name and blood—such as the hardy conquerors of Roman Britain and their Scandinavian kinsmen—it held an honoured place; a history has been traced for it, more ancient and more romantic than almost any other native plant can boast. Its other rivals of Christmas-tide, the holly and the ivy, scarcely vie with it in ancient fame and wide-spread honour: only the oak, on which it grows, has associations more venerable and historic: only the yew carries back the thoughts to a more remote antiquity, or into more poetic scenes: and none of these has the same homely charm, or is so exclusively connected with Christmas and the New Year, with England and with Herefordshire.

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THE EARTHQUAKE OF OCTOBER 6TH, 1863.

On the morning of Tuesday, the 6th of October, 1863, at about 20 minutes past 3 o'clock, Greenwich time, the sky being then free from clouds, and the air cold, calm, and clear, a very extraordinary sound was suddenly heard approaching with astonishing rapidity from the Westward.

This sound, which appeared to consist of a rapid succession of detonations, was accompanied by a tremor of the ground which made the windows rattle in their frames as in a gale of wind.

Then came a very considerable *lift* of the ground—the true earthquake wave—and, with the shock, a crash of subterranean thunder, resembling the firing of a battery of heavy guns underfoot. Immediately afterwards the sound was heard dying away in the distance.

According to Daubeny, all earthquake movements, when they are anything more than mere tremors, may be divided into three kinds—"the undulatory, the succussive, and the vorticose."

"Of these three kinds of earthquake shocks, the first is the most common and the most harmless. From the second, that of succussion, more is to be apprehended; but the vorticose movement is the one which has been felt in the most violent and disastrous catastrophies on record." (Daubeny on volcanoes, c. 32.)

The earthquake of 1863 was one of the first kind; *the undulation "proceeded onward in a uniform direction"*; * and thus although the shock, in this neighbourhood, at least, was very considerable, no serious mischief followed the movement.

The exact direction of this shock is still a matter of dispute. Indeed it is no easy thing to determine the course of an earthquake; for the best constructed seismometers have a serious difficulty to contend with, which is this,—there is no fixed point to start from; everything in an earthquake being alike in motion.

We must be satisfied, I think, with a rough approximation to the truth, trusting almost entirely to our own *feelings* and those of others.

My house faces E. S. E., the back, therefore, is turned to W. N. W. Now, according to the feelings of the members of my family, the shock struck the back of the house first and passed away by the front.

Two policemen, standing at the moment of the shock at the junction of Blue School and Widemarsh Streets, felt satisfied that the sound rolled towards

* Daubeny.

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them "down Wall Street," that is from W. by S. Others, again, are confident that the shock came from the N.W.

It is now of course impossible to determine this point, and therefore I prefer to use the term *Westward*, leaving the exact point of the compass an open question.

The duration of an earthquake, like the direction, is a point difficult to determine. Probably the sound and movement which caused so much dismay only lasted four or five seconds; but from the report of county policemen, gamekeekers, and others, I am inclined to think that slight tremors of the earth took place at intervals during the whole of that night. The game in preserves was said to be disturbed in a remarkable manner when there was apparently no movement whatever; at other times a slight motion appears to have been perceptible to man.

Few visible effects were left by the earthquake: some glass and china articles were thrown down and broken, ceilings were cracked, and so was a strong garden-wall at Holmer. The arched roof in the corridor of the City Prison, on the female side, was cracked to some extent; and in the County Gaol the arched roof of the corridor on the female side was so shaken that a fissure which had been closed was re-opened and carried to the length of twenty-seven yards. One of the chimney-pots belonging to the matron's apartments was thrown down, with some bricks, and the iron braces which tie the sides of the corridor together were so moved, that it seems probable the whole corridor would have fallen if it had not been recently repaired and braced with iron.

Few clocks appear to have been stopped by the shock: I have only been able to satisfy myself respecting two pendulum timepieces; and it is curious that the pendulums of these clocks swung in different directions.

The barometer was not, I believe, affected by the *shock*, but it was very unsteady immediately before and after the 6th of October, as the following readings will show:—

Sept.	29th—29·85	Sept.	30th—29·10
Oct.	1st—29·39	Oct.	2nd—29·69
,,	3rd—29·66	,,	4th—29·89
,,	5th—29·78	,,	6th—29·71
,,	7th—29.55	,,	8th—29·41
,,	9th—29·32	,,	10th—29·45
,,	11th—29·42	,,	12th—29·12

The reading of the exposed minimum thermometer on the night of the earthquake was (at Hereford) 34·75°.

For some days before the 6th the wind had been W. and S.W. On the 6th it changed to E., and the weather became exceedingly wet and unsettled. Early on the morning of the 8th a heavy thunderstorm took place near Hereford; the lightning being very vivid and the rain heavy.

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This earthquake appears to have been felt chiefly in the Midland counties, and its greatest force was probably experienced in the Golden Valley and in this neighbourhood. The shock was certainly a very severe one; and the underground sound was loud and appalling. Those who were awake at the time, and especially those who were out of doors, were far more powerfully affected by the sound and movement than those who were roused from their sleep by the commotion. A very intelligent policeman told me, about ten minutes after the event, that he heard the sound approaching before the shock reached the place where he stood, and felt a strange kind of terror come over himself. "It was,"—to use his own words—"more dreadful to hear it coming than to feel it when it came."

When the wave passed, the rocking of the earth was so violent that this policeman and a companion found a difficulty in keeping their footing, and were obliged to hold each other to prevent themselves from falling. Immediately afterwards they heard the sound passing away in an easterly direction.

Was this movement the effect or shock of some distant earthquake, or was it *central* with us; caused by an explosion in the earth's crust directly under this island?

Two men highly distinguished by their scientific attainments are now engaged in investigations which may throw much light on this subject. The question will be, doubtless, fully discussed at the next meeting of the British Association.

EDWIN JAMES ISBELL.

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To face page 350.

SUPPOSED AREA OF THE EARTHQUAKE (JUDGING FROM THE LETTERS SENT TO "THE TIMES"). THE VERY DARK PORTION REPRESENTS THE POINTS OF GREATEST INTENSITY IN THE SHOCK.

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METEOROLOGICAL TABLE FOR HEREFORD FOR THE YEAR 1863.

1863.	Barometer at 9-30 p.m., Mean Height.	Maximum Thermometer, Monthly Average.	Minimum Thermometer, Monthly Average.	Highest Readings of Thermometer.	Lowest Readings of Thermometer.	Rainfall in inches.	WIND. N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
							DAYS.	DAYS.	DAYS.	DAYS.	DAYS.	DAYS.	DAYS.	DAYS.
January	29·47	46·46	37·34	55·25	27·	2·25	0	5	0	5	3	11	4	3
February	29·98	49·23	38·10	57·	27·	0·15	0	2	1	0	2	14	4	3
March	29·60	51·83	37·12	64·5	27·25	0·79	1	1	1	6	5	6	3	4
April	29·66	57·72	41·88	67·	32·25	1·13	2	0	5	0	0	9	5	6
May	29·74	62·74	43·26	73·5	30·5	0·68	3	11	2	0	0	7	4	2
June	29·70	66·37	50·20	73·	44·5	2·95	1	1	1	2	4	13	4	3
July	29·98	71·55	51·30	82·5	39·	0·52	5	5	0	2	4	0	5	6
August	29·75	69·55	54·34	75·5	44·25	1·88	0	2	0	2	2	13	2	6
September	29·68	59·84	46·59	65·	38·5	1·95	0	0	0	2	2	13	9	3
October	29·63	56·12	46·0	63·33	34·25	2·91	0	2	5	6	2	9	3	2
November	29·85	49·44	42·6	59·	30·	1·57	3	1	2	0	6	14	1	1
December	29·95	48·09	39·33	54·5	28·66	0·783	0	0	0	1	1	9	11	8
TOTALS	336·99	688·94	528·06	790·80	403·16	*17·563	15	30	17	26	31	118	55	47

* Registered at Hereford Infirmary by Mr. BULLOCK. It will be seen that this amount is far below the average fall at Hereford. According to Mr. SYMONDS, "at several stations in the central parts of England the DEFICIENCY in the three years 1861-2-3 amounts to very nearly one year's average fall." "The fall was deficient in the Midland and Eastern Counties of England, and in excess in almost all other parts of the British Isles." (See "British Rainfall" for 1863.)

EDWIN JAMES ISBELL.

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HEREFORD RAINFALL DURING 14 YEARS: REGISTERED BY THE LATE HENRY LAWSON, Esq.

1826	23·378	inches.
1827	21·930	,,
1828	31·230	,,
1829	25·498	,,
1830	29·319	,,
1831	31·033	,,
1832	25·234	,,
1833	25·338	,,
1834	(lost)	
1835	29·276	,,
1836	28·168	,,
1837	26·207	,,
1838	27·643	,,
1839	34·404	,,
1840	21·381	,,
	383·039	
Mean of 14 years, and average for Hereford	27·145	inches.

Reprinted from the fourth Annual Report of the "Herefordshire Natural History, Philosophical, Antiquarian, and Literary Society."

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, THURSDAY, MAY 26TH, 1864

JOINT MEETING WITH THE CARADOC CLUB.

The First Meeting of this Club for the season took place at Kingsland on Thursday, May 26th, when the following Members and visitors were present: Rev. J. F. Crouch, President; Mr. Robert Lightbody, Rev. Chas. Smith, and Mr. Elmes Y. Steele, Vice-Presidents; Mr. R. M. Lingwood, Hon. Secretary; Hon. Member, Rev. F. Donald Carr, Hon. Secretary of the Caradoc Field Club; H. G. Bull, M.D., Mr. John Edward Lee, Mr. J. G. Morris, D. M. McCullough, M.D., Rev. T. W. Weare, and Mr. Arthur Thompson, Treasurer, &c. Visitors: Rev. Edward Cunningham, Rev. Edmund DuBuisson, Messrs. Gregg and Charles Merewether, and Master Bull. The party, after leaving Kingsland Station, walked to Croft Castle, where a Sweet-Chestnut was measured 21 feet in girth, and one of its boughs 9 feet, and several other Sweet-Chestnut trees 18 and 19 feet in girth; an Oak tree in front of the house 33 feet, and one at the back 26 feet in girth. Thence the party passed up the dingle, examining a quarry of Aymestrey Limestone on their way to Bircher Common; then on to Whiteway Head quarry of Ludlow rock, where the President shortly described the general geological features of the district. They then ascended Croft Ambury, and reached Mortimer's Cross Inn about 3 p.m. for lunch, inspecting Aymestrey Church on their way.

The statement of accounts for the year ended March 17th, 1864, audited by Dr. Bull and Mr. Thomas Cam, showed a balance in hand in the National Provincial Bank of £50 16s. 4d.

At the request of Mr. E. J. Isbell, the Meteorological observer, an Ozonometer was sanctioned to be purchased for 8s. 6d.

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Woolhope Naturalists' Field Club.

2ND FIELD MEETING, JUNE 21ST, 1864.

HAY.

The Second Field Meeting in 1864, was held at Hay, on Tuesday, June 21st. The following were present:—Mr. Chandos Wren Hoskyns in the Chair, in the absence of the President, Rev. J. F. Crouch, Mr. Elmes Y. Steele, vice-president, Dr. McCullough, Mr. C. G. Martin, Mr. J. G. Morris, and Mr. Arthur Thompson, with Rev. W. L. Bevan, T. C. Porter, and Mr. — Roberts as visitors.

The following candidates were elected members:—Rev. Edmund DuBuisson, Breinton; Rev. John Capel Hanbury, Hereford; Mr. R. Greenhow, Commercial Street, Hereford; and Mr. C. G. Martin, Bridge Street, Hereford.

The members travelled from the Barton Station at 11-30 a.m., stopping between Eardisley and Hay to inspect the old Castle and Gravel Drifts at Clifford, and the Railway Cutting.

At 4 p.m. dinner was served at the Rose and Crown Inn, Hay. Members left Hay at 7-15 p.m.

Copies of the "Transactions of the Woolhope Club," No. 5, were presented.

At the meeting particular attention was called to the following Bye-law proposed and carried unanimously at the Annual Meeting of the Club in 1863. The Bye-law was printed upon the circular—

"That each Member not answering the Secretary's circular within four clear days of the Meeting, shall be presumed to intend to be present at the Meeting, and shall be held liable for his share of the expenses, dinner, &c. And each Member signifying to the Secretary his intention of attending, shall pay his share of the conveyance and dinner, whether he avails himself of them or not, unless he shall have signified to the Secretary his intention to the contrary." Honorary Members not included.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, THURSDAY, JULY 21ST, 1864.

GOODRICH—SYMONDS YAT.

The Malvern, Woolhope, and Cotteswold Field Clubs met at Ross, on Thursday, July 21st, and went upon an exploring trip down the river to Goodrich and Symonds Yat. There were about 70 Members of the different Societies present. In the business transactions, Mr. Marcellus Newton, of Panson Cottage, Hereford, and Mr. T. Clarence Porter, 20, King Street, Hereford, were elected Members of the Club.

Unfortunately the rain prevented the Rev. W. S. Symonds, of Pendock, from delivering on Symonds' Yat, a lecture, as stated in the programme, and also rendered the intended visit to Goodrich Court impracticable.

After a pleasant excursion, the Naturalists returned to Ross, and dined at the Royal Hotel, under the Presidency of Major Guise, of the Cotteswold Club.

At the dinner, the only matter of public interest was the address on the Geology of the district, by Rev. Wm. S. Symonds, F.G.S., President of the Malvern Field Club.

GEOLOGY OF THE ROSS DISTRICT.

BY REV. W. S. SYMONDS, F.G.S.

I do not know whether my brother naturalists of the assembled field clubs, who expressed a wish that I should give them a brief résumé of the Geology of the Ross District at this meeting, have reflected on the great changes that must have affected the county and neighbourhood since that period when the records of history enable us to obtain a few glimpses of the ways and doings of our forefathers.

I hoped to have obtained the assistance of Dr. Strong, who has so ably edited the "Handbook to Ross and Archenfield," to elucidate the various subjects of archæological lore, which makes the Ross district of such great interest to the antiquarian, but I regret to say that Dr. Strong was prevented from attending our gathering, and I can only refer my friends to his handbook, which is published by Mr. Powle, who lives where lived "ye Man of Ross." A perusal of the archæological notes contained in this little work will convince you that there are few districts in Great Britain more full of records, respecting what we denominate as the historical period, than are the ancient highways and byeways of beautiful Ross.

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In these days of the "iron horse," the electric telegraph, and the many wonderful appliances of science, men live so fast, travel so fast, and think so rapidly, that it is extremely difficult to realise the almost miraculous changes which the lapse of a few hundred years have brought about in the characters, the habits and intelligence of the human inhabitants of Great Britain; and yet it is so.

What changes have occurred since the days of Queen Anne, and Alexander Pope penned his celebrated poem on the good deeds of John Kyrle, in an arbour at Pengethley; and Dean Swift, whose ancestors were Vicars of Goodrich, wandered about the ruins of the Castle which his grandfather saw demolished. What changes have passed since the garrisons of Wilton and Goodrich Castles fought like lions for King Charles, and those noble buildings were laid in ruins by the winners in that great struggle between the supporters of the King and the men who fought for the Commonwealth! But there is more, far more, to interest the lover of olden times and old histories with the historical and legendary lore of these ancient homes of some of England's noblest men.

Goodrich Castle was a stronghold in the days of Edward the Confessor, and Wilton dates from the Conquest; so that the antiquarian has much to tell of the Marshalls and Strongbows, and the Talbots, at Goodrich, and of the Grey de Wiltons, of Wilton, the ancestors of the present well-known geologist and palæontologist, Sir Philip de Grey Egerton. Nor is it only among the castellated ruins that the antiquarian searches for the records of other days. There is scarcely a village round Ross that does not possess some relics of those early ages. Edward Ironsides left the manor of Ross to the Bishops of Hereford. In the N.E. corner of Ross Churchyard there stand the ruins of a Cross which was probably erected by Bishop Betun, who lived in the time of the first Henry, days of cruelty and wrath, the days of the tragedy at Cardiff Castle, and the loss of the White Ship. We learn from Dr. Strong, that Bishop Betun afterwards obtained a grant from Stephen to hold at Ross a weekly Market.

The Church of Brampton Abbots dates from the times of the early Normans, the manor having been given to the Abbots of Gloucester by the Conqueror himself. Bridstowe (dedicated to St. Bridget), long the residence of the Rev. T. T. Lewis, one of the first and ablest of Silurian geologists, was consecrated in the days of King Harold, and before the battle of Hastings. Again, the Churches of Hentland and Whitchurch have Dubritius for their patron, and it is said that this St. Dubritius founded a college at Hentland, in the days when "Good King Arthur ruled this land."

There is "old Ariconium," also, which is said to have been swallowed by an earthquake (a progenitor, perhaps, of the earthquake which awoke Ross last year), and hills which are said to have been defended by the legions of the heroic Caractacus. In short, I doubt very much if there is more satisfactory ground in England for the searcher into human antiquities than is the border country around Ross.

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Yet what has the antiquarian been able to do beyond rescuing the merest relics of a few hundred years? And it is here that the geologist steps in with evidence that the archæologist would without his aid have been unable to unfold. The Wye, which now rolls along so steadily, is one of the many witnesses we summon for our geological evidence of the antiquity of the past. There is no geologist, who has studied the alluvial deposits of the Wye as it flows in its present geological position, who can doubt for one moment that it has flowed within its present rock boundaries for unnumbered ages. It has altered its channel since the days of Wilton Castle, no doubt, as suggested by Dr. Strong. In the course of ages, it has deposited and destroyed and reconstructed its alluvium over the alluvial plains again and again; but I finally agree with Mr. Richardson that there is every proof, from the study of the alluvial deposits of this river, that it has flowed for unnumbered ages between its present boundary of the Old Red rocks of Ross and the Mountain Limestone gorges of Symonds Yat.

And yet there was a time, remote, indeed, as far as our human capacities of time reckoning aid us, but recent in a geological sense, when the Wye flowed at a far higher level than at present, and deposited its beds of gravel and shingle far above the deposits of alluvium laid down by the existing river. The old Castle of Clifford, near Hay, stands, and has stood for centuries, upon one of the old river beds. "An ancient Castle on a hill," the hill consisting of the débris washed down by a Wye which flowed sixty feet above the plains the present river washes. It was, probably, in this period when the old rivers of Herefordshire flowed at these higher levels, that the ancient human race existed, whose implements were deposited in the drifts of the Somme Valley in France, and Bedford and other localities in England, a time when man was contemporary with numbers of extinct quadrupeds, the mammoth, the rhinoceros, the hippopotamus, and the cave bear; a period when England was a part of the continent of Europe, and before the island configuration of Great Britain was accomplished by the denudation of the boulder clay and silts which must have once filled our straits, and constituted the lands over which the extinct animals and ancient men once crossed, and recrossed long, long ago.

And here it may be asked whether the geologist possesses any evidence as to the time or period when the great gorges of the Wye between Symonds Yat and the Great Doward were excavated. In replying to this question, I must carry you back to a still more remote epoch in geological time.

There was a period well known to geologists as the glacial period, when by far the larger portion of Great Britain was submerged beneath the sea. During the maximum of this epoch, all the highest hills of Herefordshire were, without doubt, submerged, and over their summits floated ice rafts and icebergs, bearing burdens of rifted masses of rock, which were dropped, as the ice bearers melted, on the sea rocks and beds over which they floated.

I have seen numerous examples all around Herefordshire and South Wales, which I have not time to mention now; it must suffice to say that everywhere I

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have detected proofs of the transport of great masses of rock to places and situations to which they do not belong, and where they rest on rocks of an entirely different character to their own.

Let us reflect then upon our country as submerged beneath an ice traversed sea, and gradually lifted by forces acting from beneath through currents assisted by ice action, and earthquake movements acting on certain points and localities with more force than at others.

Let those who doubt go to the valleys of the Usk and Wye, and observe the upheaval which has there taken place since this period, as evidenced by the boulders, and there will be little difficulty in accounting for the rifting of the rocks of Symonds Yat along the fault of the Wye Valley, or the perching of rock masses on the external flanks of the Forest of Dean.

It is difficult to imagine the great denudation and wearing away of rock masses that took place during that long epoch which geologists call the glacial. It was a period that lasted, without doubt, for a long series of ages, and I much suspect that it was during this period that the older (Palaeozoic) deposits, such as the Coal Measures, the Carboniferous Limestone, and the Upper Old Red Sandstone were denuded over those large tracks of Herefordshire, Shropshire, and Monmouth, which are occupied by the Lower Old Red, or the Silurian rocks. The rock masses in the immediate neighbourhood of Ross consist of the Upper Old Red Sandstone and the Carboniferous rocks. The rocks that crown the summit of the Scyrrid, the Sugar Loaf, and even the lofty Vans of Brecon, are the equivalent beds of those deposits which underlie the Mountain Limestone of the Ross district. It is interesting to work out the problems of faults and upheavals which enable us to comprehend this history; but it requires study, and a personal inspection of the geology of a large district.

The Carboniferous deposits, such as the Limestone shale, the Carboniferous Limestone, the Millstone Grit, and the Coal Measures, are all present in Dean Forest, and may be all recognised if the different sections displayed in various localities be studied with care. The beds observed to-day are the Old Red Conglomerate and the Mountain Limestone, the intermediate beds—the yellow sandstone, and the limestone shale—being masked by débris. These are the rocks which underlie the regular coal seams, sandstones and clays of Dean Forest, and the South Wales coal-field.

It is impossible on an occasion of this kind to enter into details, or do more than make very broad and general statements. Enough, however, has, I trust, been said to convince the naturalist and archaeologist that there is a large field for research in the neighbourhood of Ross. If there are any present who have not hitherto made themselves acquainted with the history of the rocks, let me advise them to work out the physical geology comprehended within a few days walk or drive from Ross. I have long been an explorer of the geology of Great Britain; but I do not know any neighbourhood where so much may be learned

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of the marvellous history of days long past, of the elevation of hills, and the denudation of valleys, of changes in river-beds and the silting up of lakes, of the carrying of boulder-rocks and the rending of cliffs, of the changes in the animals that lived in the different epochs, and of the evidence of the lapse of unlimited ages—of unnumbered ages occupied by different changes in the physical geography of ancient lands and seas, than is to be gathered by one willing to learn and work from the geology of the Rocks of Ross.

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Woolhope Naturalists' Field Club.

FOURTH FIELD MEETING, THURSDAY, AUGUST 18TH, 1864.

LEDBURY.

The Fourth Field Meeting of 1864 was held on Thursday, August 18th, 1864, at Ledbury.

Rev. Charles Smith, of Tarrington, Vice-President, acted in the absence of Rev. J. F. Crouch, President for the year. The following Members attended:—Mr. Arthur Armitage, Mr. Philip Baylis, Rev. J. H. Jukes, Rev. Thomas King, Mr. Marcellus Newton, Rev. B. L. S. Stanhope, and Mr. Arthur Thompson. Mr. King, junior, came as a visitor.

The following candidates were elected Members:—Mr. Arthur Armitage, Dadnor, Ross, and Rev. Joseph H. Jukes, of Preston Wynne.

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Woolhope Naturalists' Field Club.

ANNUAL MEETING, TUESDAY, FEBRUARY 14TH, 1865.

The Annual Meeting of the Members of the Club was held on Tuesday, February 14th, at the City Arms Hotel, in this City. In the absence (through indisposition) of the President, the Rev. J. F. Crouch, of Pembridge, the Rev. Charles Smith, of Tarrington, one of the Vice-Presidents, occupied the chair. The officers were elected for the ensuing year as follows:—President, Mr. E. Y. Steele, Abergavenny; Vice-Presidents, Dr. G. P. Bevan, Llanelen; Mr. C. W. Hoskyns, Harewood; Mr. R. M. Lingwood, Lyston; Rev. H. C. Key, Stretton; Hon. Secretary, Mr. R. M. Lingwood; Treasurer and Secretary, Mr. Arthur Thompson, Hereford.

The Meetings were fixed as follows:—First: Friday, May 19th,* at Builth; second: Friday June 23rd, at Crickhowell; third: July; date and place left open to make arrangements for joining with any other Club; fourth: Friday, August 25th,† at Usk.

After the Meeting, the Members dined together at the City Arms, and in the evening attended the soirée of the Herefordshire Philosophical, Antiquarian, and Natural History Society, where, under the presidency of Mr. Wm. Aston, the following papers were read:—"An Hour in the South Wales Coal Field," by Dr. G. P. Bevan, and "A Visit to some Extinct Volcanoes on the Continent of Europe," by Mr. Edwin Lees, Honorary Member of the Woolhope Club.

The statement of accounts ending February 14th, 1865, showed a balance in hand at the Bank of £30 2s. 8d., and in hands of the Treasurer £3 10s., with investments in the Hereford Savings Bank of £37 6s. 7d. It was resolved to invest a further deposit of £20.

Mr. Edwin J. Isbell presented his Meteorological Report for 1864, and gave the following list of instruments under his charge.—Barometer, Rain Gauge, Wind Gauge, Ozone box, Sun-thermometer, the latter instrument perfectly useless.

METEOROLOGICAL OBSERVATIONS FOR THE YEAR 1864.

The year 1864 was remarkable for its dry atmosphere and the number of its fine bright days. The dryness, indeed, during the Months of April, May, June,

*Afterwards altered to May 26th.
†Afterwards altered to Monday, August 28th.

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July, and August, was so excessive as to be commonly spoken of as "*the drought*.' During this period, the difference of reading between the *dry* and *wet* bulb thermometers was commonly 10 or 12 degrees, sometimes 14, and, occasionally 16; a very extraordinary difference for this climate.

During the year 238 days were registered as *fine* or *dry*.

The heat from May to August was at times very great. On the 18th of May the thermometer in the shade rose to 81·75 degrees, and on the 5th of August to 81 degrees; but the highest reading for the year (83 degrees) was registered on the 19th of July.

Only one thunder-storm of any importance occurred at Hereford during the whole year: this storm took place on the 3rd of September, and lasted only three-quarters of an hour, in which space of time 0·785 of an inch of rain fell, the greater portion in the first twenty minutes.

The coldest weather occurred in January and February. In January the frost was severe, day and night, from the 2nd to the 9th. In February the frosts were severe at nights from the 5th to the 11th. The lowest reading of the thermometer (17·75 degrees) was registered during the January frost, and again in February.

The mean reading of the barometer for 1864 is high. The mercury rose 30 inches, or higher, on 111 days, and fell below 29 inches on 12 days only. The greatest range of the barometer took place in November: on the 6th of that month the mercurial column was 30·503 inches in height, and on the 14th the reading at 9 a.m. was 28·497 inches.

These readings, it must be observed, are not reduced to sea-level, but they are corrected for temperature, index-error, and capillarity.

Assuming the late Mr. Lawson's estimate of the mean rainfall for Hereford to be correct (27·145 inches) we are this year about 7 inches short of our average supply; the amount measured being only 20·146 inches.

Observations with the dry and wet bulb thermometers were not commenced until February, and this registration being necessarily imperfect, the results are not included in the table for the year; but I have made up a table showing the degree of humidity for each day of the month from April to August, together with the rain-fall.

Ozone registration was commenced much later in the year, and several places were tried before a satisfactory spot could be found. Scarcely a trace of ozone could be discovered in the Hereford atmosphere, but at last the Ozonometer was placed on Eign Hill, with very satisfactory results. In commencing this class of observations, I have had the advantage of Dr. Kemp's advice and assistance. The Doctor found the Bartonsham a better station for ozone observations than the City, but Eign Hill—already mentioned—has proved infinitely superior to either.

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Correct records of the velocity and pressure of the wind are very desirable, and in a practical point of view, second to none in importance. We have at present no wind-gauge in Hereford which can be depended upon; a fact much to be regretted; I therefore strongly recommend the setting up of a Robinson's Anemometer, and feel assured that the Governors of the Infirmary would readily admit such an apparatus to be placed on the roof of that building. A better situation could not be desired.

EDWIN J. ISBELL

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METEOROLOGICAL TABLE FOR 1864.

1864.	Bar. Mean Height.	Bar. Highest Readings	Bar. Lowest Readings	Ther. Average of Maxim.	Ther. Average of Minm.	Ther. Highest Reading.	Ther. Lowest Reading.	Rainfall in inches.	WIND. N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
									Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.
January	30·001	30·483	29·525	40·18	32·96	52·75	17·75	1·247	0	7	2	7	2	5	3	3
February	29·771	30·252	29·133	40·60	31·43	54·25	17·75	1·350	3	8	2	0	1	6	2	3
March	29·494	30·024	28·633	48·35	34·99	57·00	25·00	2·408	2	7	6	0	2	6	5	3
April	29·898	30·156	29·463	58·00	40·44	70·00	33·00	1·334	2	2	7	3	7	0	4	5
May	29·785	30·077	29·470	66·56	43·87	81·75	37·00	1·162	3	3	2	1	3	3	5	5
June	297·56	30·089	29·216	67·96	49·86	73·75	37·50	1·091	0	3	0	1	0	9	11	6
July	29·825	29·999	29·325	72·93	51·25	83·00	42·25	0·381	2	6	0	0	0	7	6	4
August	29·902	30·253	29.502	69·33	48·96	81·00	35·00	0·701	5	3	1	1	2	6	5	8
September	29·731	30·181	29·125	64·77	48·34	73·00	39·00	3·640	1	0	1	0	3	19	4	1
October	29·683	30·239	28·671	58·21	43·75	63·25	34·00	2·338	2	7	10	1	3	2	2	4
November	29·571	30·503	28·497	47·30	35·07	54·50	24·00	2·569	2	7	0	5	3	7	2	2
December	29·824	30·425	29·270	41·37	33·98	53·25	19·00	1·925	1	6	4	2	5	8	1	2
Totals	357·241	362·681	349·83	675·56	494·90	797·50	361·25	20·146	23	59	35	21	31	78	50	46

The Barometer readings are corrected for temperature, capillarity, and index error, but not reduced to sea-level. Hereford, according to Mr. Curley, is 188 feet above the level of the sea; the cistern of the barometer is about 180 feet above sea-level, and the correction is +0·170 nearly.

EDWIN J. ISBELL.

Barometer, mean reading for the Year, 29·77 inches. Thermometer, mean reading for the Year, 48·76 Degrees.

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THE DROUGHT.

Amount of rainfall measured at 9 a.m., and mean degree of humidity for each day.

APRIL.			MAY.			JUNE.			JULY.			AUGUST.		
D.	R.	H.	D.	R.	H.	D.	R.	H.	D.	R.	H.	D.	R.	H.
1	.050	67	1		65	1	·030	54	1		58	1	·020	66
2	·070	66	2	·075	76	2		55	2		71	2	·032	52
3	·045	85	3	·033	60	3		59	3	·093	67	3		45
4		74	4	·245	70	4		58	4	·035	60	4		62
5	·280	94	5	·094	66	5		60	5		43	5		56
6	·450	93	6		74	6		52	6		52	6		52
7	·060	91	7	·400	59	7		66	7		54	7		52
8	·012	72	8		60	8		52	8		60	8	·019	56
9	.030	89	9		79	9	·220	83	9		60	9	·268	79
10		77	10	·023	57	10	·120	59	10		63	10	·030	62
11		54	11		75	11		70	11		66	11		56
12		62	12		73	12	·090	71	12		67	12		63
13		59	13	·022	59	13	·038	57	13		60	13		52
14		56	14		55	14	·039	73	14		63	14		57
15		85	15		55	15	·101	65	15		51	15		53
16	·282	67	16		52	16		69	16		52	16		59
17	·045	59	17		51	17	·050	74	17		51	17		58
18		63	18		57	18	·219	59	18		65	18		56
19		56	19		58	19		68	19		56	19		63
20		57	20	·210	57	20		71	20		53	20		53
21		43	21		61	21		60	21		67	21		62
22		51	22		67	22		70	22	·025	75	22		52
23		48	23		73	23	·135	72	23		50	23		58
24		71	24		53	24		73	24		54	24		67
25		64	25		62	25	·025	67	25		72	25	·020	69
26		68	26		55	26		57	26	·075	55	26	·030	56
27		67	27		51	27		52	27		49	27		61
28	·010	76	28		53	28		70	28	·120	76	28	·010	83
29		60	29		61	29	·023	65	29	·005	50	29	·040	63
30		62	30		52	30	·010	55	39		62	30	·252	68
			31	·060	84				31	·028	77	31		61
	1·334 Inch.	Mean 68.		1·162 Inch.	Mean 62		1·091 Inch	Mean 62		1·381 Inch.	Mean 60		0·721 Inch.	Mean 60

Explanation, D. day, R. rainfall, H. mean degree of humidity, complete saturation being 100, 45 extraordinary dryness.

EDWIN J. ISBELL

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OZONE TABLE.

NOVEMBER.			DECEMBER.		
	9 a.m.	9 p.m.		9 a.m.	9 p.m.
1st	5	6	1st	4	4
2nd	2	1	2nd	1	2
3rd	0	0	3rd	7	6
4th	0	9	4th	7	5
5th	0	0	5th		
6th	1	2	6th	0	2
7th	0	0	7th	8	8
8th	0	0	8th	9	3
9th	0	0	9th	5	2
10th	0	0	10th	6	5
11th	0	0	11th	6	4
12th	0	0	12th	9	4
13th	8	4	13th	9	8
14th	5	3	14th	6	2
15th	4	0	15th	4	1
16th	0	0	16th	1	6
17th	5	8	17th	0	0
18th	10	5	18th	0	0
19th	5	4	19th	1	1
20th	9	6	20th	1	0
21st	1	6	21st	0	0
22nd	8	7	22nd	5	7
23rd	7	2	23rd	4	3
24th	0	0	24th	4	3
25th	4	7	25th	2	3
26th	8	5	26th	4	2
27th	5	7	27th	0	0
28th	10	4	28th	0	0
29th	7	3	29th	0	0
30th	7	7	30th	1	0
			31st	0	0

In this table the amount of Ozone in the Atmosphere is expressed by the figures 0 to 10 according to a given scale.

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Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, FRIDAY, MAY 19TH, 1865.

BUILTH.

By a requisition, signed by the President and five members of the Club, the date for this meeting was altered from May 26th to May 19th.

No record can be found of the proceedings of the day. The minutes of the Club show that Mr. Isaac Davis, C.E., of Brecon, and Rev. F. J. Eld, of Worcester, and Rev. Wm. J. T. Llanthomas, of Hay, were elected members of the Club.

Letters were read from the Caradoc Club and from the Dudley Club, proposing a joint meeting of the Clubs on 18th and 19th July at Ludlow.

The meeting was attended by Mr. Elmes Y. Steele (the President), and Dr. G. P. Bevan, R. M. Lingwood, and Rev. H. C. Key (Vice-Presidents), and by the following Members:—Mr. Arthur Armitage, Mr. R. W. Banks, Mr. T. Cam, Rev. G. Cornewall, Rev. E. Du Buisson, Dr. W. L. Gililand, Rev. J. H. Jukes, Mr. C. G. Martin, Mr. Marcellus Newton, Rev. H. W. Phillott, Mr. Alfred Purchas, Rev. Charles Smith, Rev. Thos. Woodhouse, and Mr. Arthur Thompson (Treasurer and Secretary); and by the following visitors:—Mr. Henry Blashill, Mr. Alfred Kent, Mr. Southall, and Rev. Wm. J. T. Llanthomas, of Hay, from whom permission was granted to visit the quarries on the Wellfield estate. Some local geologists and others interested joined the party on their arrival at Builth, namely, Mr. D. Griffiths, Rev. — Jenkins, Mr. Jones, Rev. — Powell, Rev. — Price, Dr. James Sherlock, and Rev. R. H. Williams.

A letter was read from Mr. E. J. Isbell notifying his intention oi leaving Hereford, and consequently his desire to deliver up the meteorological instruments of the Club in his possession.

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LIST OF FOSSILS FOUND IN THE BUILTH DISTRICT.

By Messrs. Powell and Griffiths.

Llandeilo Flag.

Ogygia Buchii. Portlockii. Asaphus tyrannus. Trinucleus fimbriatus „ concentricus. Calymene duplicata. Euomphalus perturbatus.	*Gwernyfydd.*
Lingula Davisii, in addition to the above	*Wellfield.*
Trinucleus Lloydii. Theca triangularis.	*Wellfield Lodge.*
Siphonotreta micula. Lingula attenuata. Ampyx nudus. Diplograpsus pristis. Agnostus Mc'Coyii.	*Pen-cerig.*
Didymograpsus Murchisonii. Ogygia Corndensis (A. Powisii.)?	*Gilwern Hills, near Llandrindod.*

Volcanic Grit Overlying Llandilo.

Asaphus tyrannus. Orthis flabellulum.	*Western flank of the Caerneddau Hills.*

Upper Llandovery.

Pentamerus oblongus.
Petraia subduplicata.
Orthis radians.

Wenlock Shale.

Cyathophyllum. Acidaspis Jamesii. Graptolites Ludensis. „ Sedgwickii.	*Pen-cerig.*
Cardiola interrupta. Pterinea Sowerbyi. Lingula plumbea. Rhynchonella. Orbicula.	*Builth Bridge.*

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Phacops caudatus. Calymene Davisii. Orthoceras bullatum. Theca Forbesii (rare). Lituites cornu-arietis (rare).	*Near Aberdshonow.*
Cardiola fibrosa (rare).	*River-bed, near Aberdshonow.*
Orthoceras (new). „ canaliculatum. „ angulatum. Phragmoceras intermedium. Lituites Ibex. Calymene Blumenbachii.	*Banks of Irvon near Builth.*

UPPER LUDLOW.

Orthoceras distans. „ dimidiatum. „ Ludense. Ecculiomphalus Bucklandii. Orthonota (several sp.). Rhynconella. Orbicula rugata. Lingula Lewisii. Homalonotus Knightii (rare). Encrinurus punctatus (rare). Serpulites longissimus. Holopella conica. Tentaculites annulatus.	*Aberedw and Erwood.*

LOWEST BEDS OF OLD RED SANDSTONE.

Orthoceras tracheale. „ semipartitum. „ filosum. Modiolopsis lævis. Holopella obsoleta. Trochus helicites. Leptœna lata. Cypricardia cymbæformis. Bellerophon striatus. „ carinatus. Turbo Williamsii ? Illænus Davisii ?	*Gwenddwr.*

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Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, FRIDAY, JUNE 23RD, 1865.

CRICKHOWELL.

After breakfast at the Angel Hotel, Abergavenny, the members proceeded by omnibus to Crickhowell, whence they ascended The Daren, and on up the hill to Pen-cerig-calch, returning to Abergavenny for dinner.

In consequence of Mr. Isbell leaving Hereford, Mr. Wm. Cooke who had assisted Mr. Isbell, was requested to continue his services.

A letter was read from Rev. P. B. Brodie asking for a paper from any Member to be read at the proposed meeting at Birmingham, in next September, of the British Association for the Advancement of Science. The following attended this Meeting: Mr. Elmes Y. Steele, President; Dr. G. P. Bevan, Vice-President; Mr. Thomas Blashill, Dr. Bull, Mr. Cam, Mr. T. Curley, Rev. E. J. Eld, Mr. Richard Hereford, and Rev. R. Hereford, Rev. J. Capel Hanbury, Rev. J. H. Jukes, Mr. C. G. Martin, Rev. Charles Smith, and Mr. Arthur Thompson, Secretary.

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Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, TUESDAY, JULY 18TH, AND WEDNESDAY, JULY 19TH, 1865.

LUDLOW AND CRAVEN ARMS.

JOINT MEETING WITH THE CARADOC AND THE DUDLEY CLUBS.

There is no full account to be found of the proceedings of these two days. The President, Secretary, and a few others, in awaiting for some time the arrival of the members of the Dudley Club, the remainder of the [party proceeded on their route, and remained divided from the others of the party.

The President's party after examining the Bone-bed in Ludford Lane, Upper Ludlow quarries on the Whitcliffe range, and faults letting in Aymestry Limestone, and quarries along the Wigmore road by Mary Knole, crossed through the Downton grounds to Bow Bridge (Aymestry Limestone), thence through Downton Castle grounds (Upper Ludlow, Bone-bed, and Old Red) to the Forge Bridge and Tin Mills (Passage Beds) to the Downton Arms Inn, where, in consequence of its being the Election-day at Ludlow, refreshments had been prepared for them.

The following attended the meeting :—Mr. Elmes Y. Steele, President; Rev. George Cornewall, Rev. E. Du Buisson, Mr. T. Curley, Rev. J. D. La Touche, Mr. R. Lightbody, Mr. C. G. Martin, Rev. H. W. Phillott, Col. Scudamore, and Mr. Arthur Thompson. Visitors: Master Lightbody, Mr. Soper, and Mr. Wilson.

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Woolhope Naturalists' Field Club.

FOURTH FIELD MEETING, MONDAY, AUGUST 28TH, 1865.

USK.

No record can be found of the proceedings. By the minutes of the Club a large party of visitors, including ladies, joined the party. Of the members of the Club there were present: Mr. Elmes Y. Steele, President; Rev. H. C. Key, Vice-President; Rev. J. H. Jukes, Mr. J. E. Lee, Mr. M. Newton, Mr. W. Nicholls, and Mr. Arthur Thompson, Secretary.

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Woolhope Naturalists' Field Club.

THE ADDRESS

Of the retiring President, ELMES Y. STEELE, ESQ., read at the Annual Meeting of the Woolhope Naturalists' Field Club, held at Hereford, February 22nd, 1866.

GENTLEMEN OF THE WOOLHOPE CLUB,

I return you my sincere thanks for the honour you have done me in appointing me your President for the past year, and for the courtesy and kindness you have shown me, as well as for the indulgence you have so freely extended to my inefficient performance of the duties of that office. Seeing that I cannot lay claim to more than a very superficial acquaintance with the sciences we cultivate, I feel that your considerate and very flattering treatment is solely attributable to your kindly feeling towards a fellow-student, who was thought to take a sincere interest in the welfare of the Club, and to be disposed to promote the success of its operations to the best of his ability.

On reviewing the past season I think I may, upon the whole, congratulate you on the success of our field days. We had the benefit of a Summer remarkable for its almost unprecedented number of fine days, and, although on two occasions our perambulations were somewhat impeded by heavy showers of rain, we had not one absolutely bad day, and our energies proved equal to every occasion.

Our First Meeting on the 19th May, at Builth, was a remarkably successful one, and was graced by a considerable phalanx of members and friends. The District into which we travelled opened up new ground, and that circumstance of itself would account for much of the interest we derived from it; but we were highly favoured in all other respects. The Rev. Jones Thomas kindly met us at the Three Cocks Junction, and throughout the day exerted himself in doing honour to the Club, in a manner so courteous and genial, as to deserve a grateful recognition of his kind services. He undertook the duty of leader, on the march, and nothing could exceed the care he bestowed in pointing out the many scenes and objects of interest to be met with, in the well selected line chosen by him for our excursion. In the name of the Club I had the pleasure to present to him the cordial thanks due to his kind and hospitable exertions. We were also favoured with the company of several local Geologists, who have done excellent work in the surrounding district; under their guidance some interesting fossils were obtained, amongst them the following:—

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At Gwernyfydd. (*Llandeilo flag.*)

Ampyx nudus.
Ogygia Buchii.
Ogygia Portlockii.
Calymene duplicata.
Trinucleus fimbriatus.
Trinucleus concentricus.

At Wellfield. (*Llandeilo flag.*)

Ogygia Buchii.
Siphonotreta micula.

At Pen-cerig. (*Llandeilo flag.*)

Ogygia Buchii.
Ampyx nudus.
Siphonotreta micula.
Diplograspsus pristis.

(*Upper Llandovery.*)

Pentamerus oblongus.
Orthis radians and a Petraia.

(*Wenlock Shale.*)

Graptolites Ludensis.
,, Sedgwickii and an Orthoceras.

Some interesting plants were found, amongst them conspicuously and abundantly Trollius Europæus, Allium Schœnoprasum. Also a few specimens of Botrychium lunare, and several choice species not sufficiently rare to require special mention. Every member who had the good fortune to attend that meeting, must have been impressed with the beauty and variety of the striking scenery which had been spread out before him on all sides; and must have brought away with him a delightful impression of a day most agreeably and profitably spent. In company with some friends I remained behind, to make further acquaintance with the locality, and this afforded me the opportunity of seeing a very fine collection of Silurian fossils, obtained in the district, by Messrs. Powell and Griffiths, of Builth, who have kindly furnished me with a List, a copy of which I now present to you. I cannot leave the subject of the Builth meeting, without congratulating you on the opening out of so fine a field for your future operations.

Our Second Meeting took place on the 23rd of June. It was well attended and passed off satisfactorily. The members assembled at Abergavenny, and travelled by omnibus up the lovely vale of Usk, to Crickhowell; there we took to our legs and made excellent use of them in ascending by the Darren, to the Pen-cerig calch, or Table Mountain; returning by the Crughwel, which gives its name (conspicuous heap) to the Village at its foot—at the Darren we had in view a very bold escarpment of the uppermost beds of the Old Red, with its pale yellow Sandstone and purple shaly beds, in both of which we searched, but in vain, for the celebrated Holoptychius scales; higher up we crossed the Carboniferous Limestone, and at the highest point stood on a platform of Millstone Grit, which remains a relic of ancient beds of the Carboniferous series, long since washed away from the mountainous district which stretches towards the North, the East, and the West, for a considerable distance. Immediately facing us, in a southerly direction and across the lovely Valley of the Usk, rose up the fine bold escarpment of Carboniferous Limestone which forms the

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northern edge of the Monmouthshire Coal and Iron basin. All the points of interest I have mentioned were displayed from the summit of the Pen-cerig calch, and if we were not rewarded for our exertions by the discovery of any rare fossils or plants, those who stood on that famous outlier for the first time must, think, have felt themselves repaid for the toil of the ascent.

On the 18th and 19th July, we met at Ludlow, and at the Craven Arms several members of the Dudley and Caradoc Clubs. The first day's operations were somewhat impaired by the weather. However, under the guidance of our excellent and scientific associate Mr. Lightbody, who appears to know intimately every rock and every fossil of the district, we traversed a very beautiful and interesting line of country, and found many objects worthy of our hammers, over which we had the advantage of all the scientific assistance we could require from our learned associates at Ludlow.

On the second day we started from the Craven Arms up the Onybrook. We lingered for a considerable time at the well-known Caradoc Shale Bank, where innumerable specimens, none however quite perfect, of Trinucleus concentricus were obtained, besides other interesting Fossils. We then walked on to Horderly, and were well rewarded for our search in the interesting strata met with on the line of march. After this we all re-assembled at Stokesay Castle, where we found ample and much needed refreshment, and where Mr. La Touche exhibited a beautiful model constructed by himself of the Geological features presented by the surrounding country.

On the 26th July, at the kind invitation of the Malvern Club, I had the pleasure of a delightful field day in the Malvern Hill District. The points of Geological interest were: to receive from Dr. Holl, a demonstration of the Laurentian or Pre-Cambriam Rocks, discovered by his most able and extensive researches; and to visit some very interesting excavations in the Drift Beds near Clencher's Mill, made by the Malvern Club, under the supervision of their learned and indefatigable President, Mr. Symonds. On that occasion the Cotteswold Club was represented by its President, Sir William Guise, and your Society was represented by Mr. Lightbody, by our excellent and painstaking Secretary, Mr. Thompson, and by your President. We had a delightful day; Dr. Holl most efficiently and satisfactorily explained the very interesting and conclusive views he had been able to take of the Geology of the Malvern District, and exhibited the unmistakable evidences of the existence of the Laurentian Rocks, near the Wind's Point, and at Midsummer Hill. I shall not dwell upon these discoveries, as Dr. Holl has been so kind as to send me a copy of his admirable paper on the subject, published by the Geological Society. That pamphlet I have now the pleasure of offering to the perusal of any member of the Woolhope Club who may feel interested in it. Our party, which was numerous, and graced with the presence of many ladies, met to dinner at the Eastnor Arms. I returned thanks in your name for the toast of "Prosperity to the Woolhope Club." After Dinner we proceeded to inspect the excavation in the Drift Bed, near Clincher's Mill. Many Fossil remains of an interesting character, principally

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bones of the Elephas primigenius (Mammoth) and Rhinoceros tichorrhinus were there exhibited. Mr. Symonds favoured us, in his usual kind manner, with observations on the history of the Drift, and its evidences of early life. We then adjourned to Bromesberrow Rectory, where we concluded the operations of a most agreeable day in doing justice to the refreshing hospitality of Mr. Hill, the Secretary of the Malvern Club.

Our last Meeting was fixed for the 28th of August, at Usk, and as generally happens to us in that locality, our operations were seriously interfered with by rain. We found much to interest us in the railway cutting, at the mouth of the tunnel; thence we proceeded to view the valuable collection of Fossils, from the district, kindly offered to our inspection by Mr. William Nicholl. We saw a great variety of specimens, including many capital Trilobites, some rare Brachiopods and Corals, and many of the Pteraspis and Cephalaspis, fishes of the Old Red Sandstone. Amongst the Trilobites, conspicuous was Homalonotus, at first supposed to be Delphinocephalus, but recently defined as a new species, which, as far as I know, is peculiar to the Wenlock shale forming the bed of the Usk, near Graig-y-Garcoed. This Fossil has been named by Salter, Homalonotus Johannis, after the christian name of Mr. John Lee, of the Priory, Caerleon, one of our Woolhopian Geologists, who with Mr. William Nicholl, first discovered this interesting crustacean. Dr. Grindrod, of Malvern, attended our Field-day, and brought with him from his own unrivalled collection, a splendid and perfect specimen of the H. delphinocephalus, which we were thus enabled to compare with the new species. After inspection of Mr. Nicholl's Silurian and Devonian Fossils, we proceeded, despite of the falling rain, to a small quarry at Llanbaddock, where innumerable Ludlow Fossils were found, amongst them many specimens of Phacops caudatus and longicaudatus; thence, along the railway through a cutting in the Wenlock-shale, where Atrypa reticularis is most abundant, we made our way to Garcoed. In the river bed, although the water was too deep, from recent rains, for a good search, we were able to find Homalonotus Johannis, and in the bank higher up the stream, many other fossils of the Wenlock series. On our return to Usk, we dined together at the Three Salmons. Dr. Grindrod's beautiful specimen of the Homalonotus delphinocephalus was passed round the table, and I had the pleasure to thank that gentleman in the name of the Club, for his kindness in joining our party and giving us the opportunity of seeing so fine a Fossil. Mr. Lea, of Caerleon, was our guide on the excursion, and his knowledge of the locality and of its points of scientific interest, was of the greatest service to us.

There is a point which I desire to press upon your notice in connexion with our Field-days, and I do so because I am quite convinced by my own experience, that much of the comfort, and more still of the benefit to be derived from these meetings, greatly depends upon a careful attention to it. I suggest that it will be advisable in future to make it an invariable rule of the Club that, the Itinerary for each day, shall be arranged beforehand, printed in the programme, and rigidly adhered to on all occasions. Gentlemen arriving from a distance, being strangers to the district, will naturally place themselves under the guid-

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ance of their local associates whose help they look for. All who may happen to stray will, by reference to the printed route, be enabled to strike the line of march without difficulty. Alternative routes are, I think, very objectionable, as tending to separate the party and dislocate the arrangements made for the pleasure and enjoyment of all. I think it very important, also, that whoever may be good enough to set out an Itinerary, should limit the proposed operations within moderate bounds; for it is far more satisfactory and profitable in the end to examine one or two localities thoroughly, than to hurry over interesting objects for want of time to devote to them.

There is one more suggestion I would offer for your consideration, in the hope that it may lead to the better accomplishment of one of our main objects, which I take to be to improve the general stock of information on all matters of scientific interest belonging to our district. I would urge the Club to impress upon every member the propriety of communicating any discovery that may fall in his way in Geology, Botany, or Zoology, to some central authority, to whom the charge would be entrusted to report thereupon to the Club. The best mode of carrying this into effect would, of course, be matter for your discussion.

Last summer, Dr. Bull was kind enough to transmit to me a specimen of a very singular plant found by him near Hereford, the Xanthium spinosum; in return I sent him a curious plant found by myself near Abergavenny, the Blitum virgatum. I shall not now describe these interesting plants, because I hope Dr. Bull will kindly favour the Club with an account of them at his convenience.

It now only remains for me, Gentlemen, to perform the sad task of reminding you of the loss we have sustained by the death of one of our oldest members, who for many years evinced a deep interest in our prosperity, and seldom failed, so long as health and strength permitted, to join our Field Meetings, at which his cordial manner and polished conversation contributed materially to the enjoyment of all who had the pleasure of his company; I allude to our old friend Mr. Bodenham, of Rotherwas. We shall see him no more amongst us, Gentlemen, but I am sure we shall long remember him, and regret that death should have deprived us of so valued an associate.

Mr. Lingwood and Mr. Chandos Wren Hoskyns, who have been long prominent and useful members of the Woolhope Club, have retired to the Continent. In their case we may hope that the separation is but a temporary one—I earnestly wish, as you all do, that they may speedily return with a renewed zest for our interesting pursuits. Mr. Lingwood's services deserve a special acknowment from us, for he was at all times most cheerfully willing to assist any of us, from the stores of his extensive information, on all subjects of Natural Science.

With warmest wishes for the success and prosperity of the Club through many future years, I now retire from a post of honour which I owe to your kind indulgence, and from which I have derived unmixed pleasure and enjoyment.

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METEOROLOGICAL OBSERVATIONS FOR THE YEAR 1865.

The most remarkable Meteorological fact in 1865 was the almost entire absence of rain during the month of September; twenty-eight days were registered *fine*, and on the other two days ·04 of an inch of rain fell, or in plainer figures only $\frac{1}{25}$ of an inch; the months of April and June were also very dry, there being twenty-four fine days in the former, and twenty-five in the latter month. The rainfall in April was very much below the average, but not so much in June, as on the two last days of the month there fell 1·07 inches. The month of August was remarkable for its being the wettest, owing principally to the thunderstorms which were so frequent; October was the next wettest month; these two months form a striking contrast with September. January and February are noticeable for heavy falls of snow. The most remarkable fall we have had for some years commenced on the night of the 25th January, and continued more or less until noon on 27th, when the average depth was taken and found to be 10½ inches; in places where it had drifted it was from 8 to 10 feet deep, and it had not disappeared when there was another heavy fall on 16th February, when it averaged 5 inches deep, and continued on the ground till the end of the month.

There were several thunderstorms worth mentioning; the first occurred on May 9th, when ·82 of an inch fell in two showers between the hours of 5 and 11 a.m. There was another storm on the 6th July, ·71 of an inch falling at intervals during the morning; the next was a hail storm on the 9th July, on this occasion ⅜ of an inch fell in 12 minutes; there were also two heavy storms on 12th and 23rd of August, both falls amounting to ¾ of an inch each.

The Thermometer was unusually high in April, on the 26th and 27th it rose to 72·9 and 72·6 respectively, the mean temperature was 5 degrees above the average. June was the hottest month in the year, on the 22nd the thermometer rose to 87·6; it was above 80° on six days and above 70° on twenty days. September was almost as remarkable for the height of the temperature as for the extreme dryness; the thermometer was above 70° on nineteen consecutive days; on one occasion it rose to 78·0, and once to 77·0, the mean temperature was considerably above the average.

January was the coldest month; frost on seventeen nights; on the 29th the thermometer fell to 3·6, the lowest reading since December, 1860. February and March were also two very cold months; there were fourteen frosts in the former and thirteen in the latter month, the mean temperature in both was was several degrees below the average.

There were 193 days registered as fine. The rainfall 25·005 inches is, according to Mr. Lawson, 2 inches below the average.

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The Barometer was a very fair height, nearly as high as in 1864; the greatest range took place in January, it rose to 30·143 and fell to 28·295 within ten days; the highest reading occurred on 15th December, 30·577, and the lowest on 14th January, 28·295.

Ozone observations have been carried on at Hampton Park, there was less in September than any other month, and it was most abundant in January and February.

WILLIAM COOKE.

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METEOROLOGICAL TABLE FOR 1865.

1865.	Bar. Mean Height.	Bar. Highest Reading.	Bar. Lowest Reading.	Ther. Highest Reading.	Ther. Lowest Reading.	Mean Temp.	Rainfall.	Ozone Mean Amount.	WIND. N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
									days	days	days	days	days	days	days	days
							inches.									
January	29·366	30·143	28·295	52·0	3·6	35·2	2·867	3	2	2	3	2	2	4	5	4
February ..	29·695	30·431	28·635	52·2	22·6	36·5	1·962	4	0	6	2	4	2	7	2	5
March	29·732	30·190	29·084	52·0	24·0	36·5	0·921	1⅝	3	4	3	5	2	3	1	10
April	29·944	30·127	29·590	72·9	28·2	51·2	0·638	1½	0	9	4	5	1	3	1	1
May	29·730	30·179	29·370	76·9	3·53	53·1	2·458	2⅝	3	0	0	2	3	5	3	2
June	30·406	30·380	29·208	87·6	43·8	60·7	1·614	1⅝	0	4	3	0	3	5	2	3
July	29·764	30·182	29·496	80·3	45·7	60·8	2·274	1½	1	0	0	1	3	2	1	3
August	29·676	30·134	29·335	74·4	39·2	57·2	3·980	2	2	1	0	2	5	3	0	3
September ..	30·060	30·338	29·758	78·0	38·7	59·9	0·040	1¼	1	4	1	1	3	5	0	1
							*0·084									
October	29·406	30·062	28·792	69·0	32·0	50·6	3·770	1¾	0	3	3	1	1	1	3	2
November ..	29·675	30·267	28·529	58·0	27·0	43·3	2·733	1¾	3	1	2	3	0	4	4	0
December ..	29·994	30·577	29·083	55·0	25·5	41·8	1·664	2⅛	0	0	3	6	1	2	2	0
Totals	357·088	363·010	349·175	808·3	365·6	586·8	25·005	25	15	34	24	32	26	44	24	34

The Barometer readings are corrected for temperature, capillarity, and index error, but not reduced to sea-level. Hereford, according to Mr. Curley, is about 188 feet above the sea, and the correction would be +0·170 nearly.

Average reading of Barometer, 29·757. Mean Temperature, 48·9. Mean Amount of Ozone, 2.

* Dew.

WILLIAM COOKE.

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MEETINGS.

1852.

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ERRATA.

Page 343. See the ERRATA upon this page referring to Dr. Bull's very long paper on "The Mistletoe in Herefordshire," and make the necessary corrections upon pages 316, 318, and 323.

Page 361, line 19. For "May 19th" read "May 26th." Again, in the Foot-note upon the same page, for "May 26th" read "May 19th."

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